FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1924

May 29 .... Wilbur Wright Lecture, Royal Aeronautical Society: "Fuel Economy in Flight," by Lieut.-Col. H. T. Tizard, A.F.C.
,, **30** .... Institute of Transport Congress at Bristol
,, **31–June 9** Third Czecho-Slovak International Aeronautical Exhibition, Prague
June 15 .... Gordon Bennett Balloon Race, Belgium
,, **21** .... F.A.I. Conference Opens, Paris
,, **24** .... Independent Force (R.A.F.) 6th Annual Reunion Dinner at R.A.F. Club
,, **25** .... R.N.A.S. and 5th Group, R.A.F., annual dinner
,, **28** .... Royal Air Force Pageant, Hendon
July 24–Aug. 10 Tour de France for Light 'Planes
Aug. 4 .... Aerial Derby at Lympne
,, **4** .... Holiday Light Aeroplane Handicap at Lympne
Sept. 8–13 Light 'Plane Competitions at Lympne
Oct. 2 .... Aero Golfing Society. Autumn Meeting, at Moor Park Golf Club, for A.G.S. Challenge Cup presented by Cellon (Richmond) Ltd.

EDITORIAL COMMENT.

THE present issue of FLIGHT is of a rather exceptional character inasmuch as the great majority of its pages are devoted to an illustrated account of the British aircraft industry as it exists today. The occasion is, of course, the holding of the Third International Aero Exhibition at Prague, where, for the first time, Great Britain will be represented. The decision to participate in this Exhibition was arrived at somewhat late, with the consequence that, for one thing, the number of British firms represented at the Show is not as large as one could have wished. Nevertheless, a sufficient, number of aircraft and aero engines, equipment, etc., will be shown to give Czechoslovakia a very fair idea of the excellence of British machines and engines. In order, however, to bring to the notice of the Czechoslovak Republic, and of the thousands of visitors who will undoubtedly flock to Prague during the next two weeks, the products of such British firms as have been unable to arrange for an exhibit, we decided to compile an article dealing with all British aircraft, engines, equipment, etc., of which particulars were available.

The British Aircraft Industry and the Prague Aero Show

Needless to say, under these conditions, space has not allowed of lengthy detailed descriptions of every machine and engine. To have done so would have necessitated an issue many times as large as the present one. It was, therefore, decided to publish, in preference to long descriptive articles of relatively few machines, photographs and brief particulars of as many machines as possible. In this way a much better idea can, we think, be formed of the surprisingly large variety of types produced by British aircraft constructors, and the data given will, it is hoped, be found in most cases to be such as to convey the essential features of each machine and its performance. In the case of aero engines also we have not attempted to describe in detail the constructional features, materials employed for the various components, etc., but have confined ourselves to giving one or more views of an engine, data relating to its weight, power

output, fuel and oil consumption and so forth. Wherever possible we have given a power curve and curves of mean effective pressure, and of petrol consumption at various speeds, so that with the data given a designer should be able to pick out the engine which best suits his particular requirements. As most of the British engine firms will be represented at Prague, visitors to the Show will be able to examine for themselves such constructional features as we, through lack of space, have been prevented from giving.

We commenced by saying that this issue of FLIGHT is of an unusual character. By this we do not so much mean the publication in one issue of particulars of the whole of the British industry as the size of the publication and manner in which it has been arranged. It seemed to us that such an issue should primarily be arranged so that readers not familiar with the British aircraft industry could easily and conveniently refer to any type of machine or engine required. Consequently, we have arranged the British industry article in five main sections. The first of these gives a very brief biographical and historical sketch of the different aircraft and engine firms, so that Central European readers may be in a position to form some idea of what the various firms have done and are doing and who the leading personalities are.

This section is followed by a classified index, in which the machines have been arranged according to type, being first divided into two main classes: Military and Civil, these divisions being in turn subdivided into land aeroplanes, seaplanes and flying boats, and amphibians. Under the various subdivisions the machines have been grouped according to type, as Single-seater Fighters, Two-seater Fighters and so forth. In this index, it should be pointed out, certain machines have been included of which no mention has been made in the descriptive sections. The reason is that, owing to considerations of space, it has not been possible for us to refer to *all* the machines made by every firm, but where certain types have seemed to us to merit inclusion we have, in such cases, given the type and name of the machine under its appropriate heading.

The descriptive sections of the article commences with Military Types, as these are in preponderance, and these have been arranged alphabetically under the titles of the firms. Then follows the section dealing with Civil Aircraft, in which again alphabetical arrangement has been followed. This section is necessarily much smaller, as there are fewer firms producing commercial or other civil aircraft. The next section deals with aero engines, and the last section with aero accessories and equipment.

With regard to the Prague Exhibition itself, although it may not rank in importance and magnitude with the Gothenburg Show of last year, nevertheless, it will by no means be unimportant, and in this connection it may be mentioned that in spite of the late British decision to participate, a very favourable position has, we understand, been allocated to the British section. It has been mentioned several times in our columns that Czechoslovakia is one of the States to emerge most successfully from the war, 1914–18, and already its economic and political assets are much greater than its size and the number of its inhabitants would suggest. Its position in the heart of Europe, at the cross-roads, so to speak, between East and West, lends Prague a considerable advantage as a centre of European air transport. At present Prague has air connection with Paris, Warsaw and Bucharest. As soon as the opposition of the German government can be overcome it will be connected with London.

We wish the Prague Exhibition every success, and hope, subject to the idiosyncrasies of the postal authorities, to be able to publish in our next issue a detailed report from our special representative.

Owing to the extent of our illustrated article on the British Aircraft Industry, many of the regular features have necessarily had to be held over this week.

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AIR MAILS TO NORTHERN EUROPE

THE Postmaster-General announces that as from May 31 letters and parcels may be posted for transmission to certain countries of North Europe by the new (or revised) Air Mail services mentioned below:

New letter air mails (for all classes of correspondence) will be closed at the General Post Office, London, at 6 p.m. each week-day, except Saturday, for Germany (Hamburg and district), Denmark (all parts), Norway (all parts on Tuesday and Thursday, east and north on Monday, Wednesday and Friday), Sweden and Finland (all parts). An additional air mail for Denmark and South Sweden (Malmo and district) will be closed at the General Post Office, London, at 7.30 a.m. each week-day, except Saturday, beginning on Tuesday, May 27, and at 7 a.m. on Sunday. The special fees payable, in addition to ordinary foreign postage, will be: On letters for Hamburg and district, 3*d.* per oz.; for Denmark, Norway, Sweden and Finland, 4*d.* per oz. (The fee on letters for occupied Germany forwarded by London-Cologne air mail will remain at 2*d.* per oz.)

Speaking generally, letters from London or the provinces should by the use of these new air mails gain from 12 to 21 hours in delivery in Copenhagen whatever the time of posting; while night mail postings from London should gain up to 24 hours in transmission to Christiania, Stockholm and Finland. No acceleration will, however, be obtained for letters to countries other than Denmark posted in the provinces in time for transmission to the Continent by first day boat.

New parcel air mails to Germany, Denmark, Norway, and Sweden will be closed at the General Post Office, London, at 1.15 p.m. each week-day (12.30 p.m. on Saturday). There should ensure a gain in time of transmission to any part of Germany or Denmark of one to three days, and to any part of Sweden or Norway of two to four days.

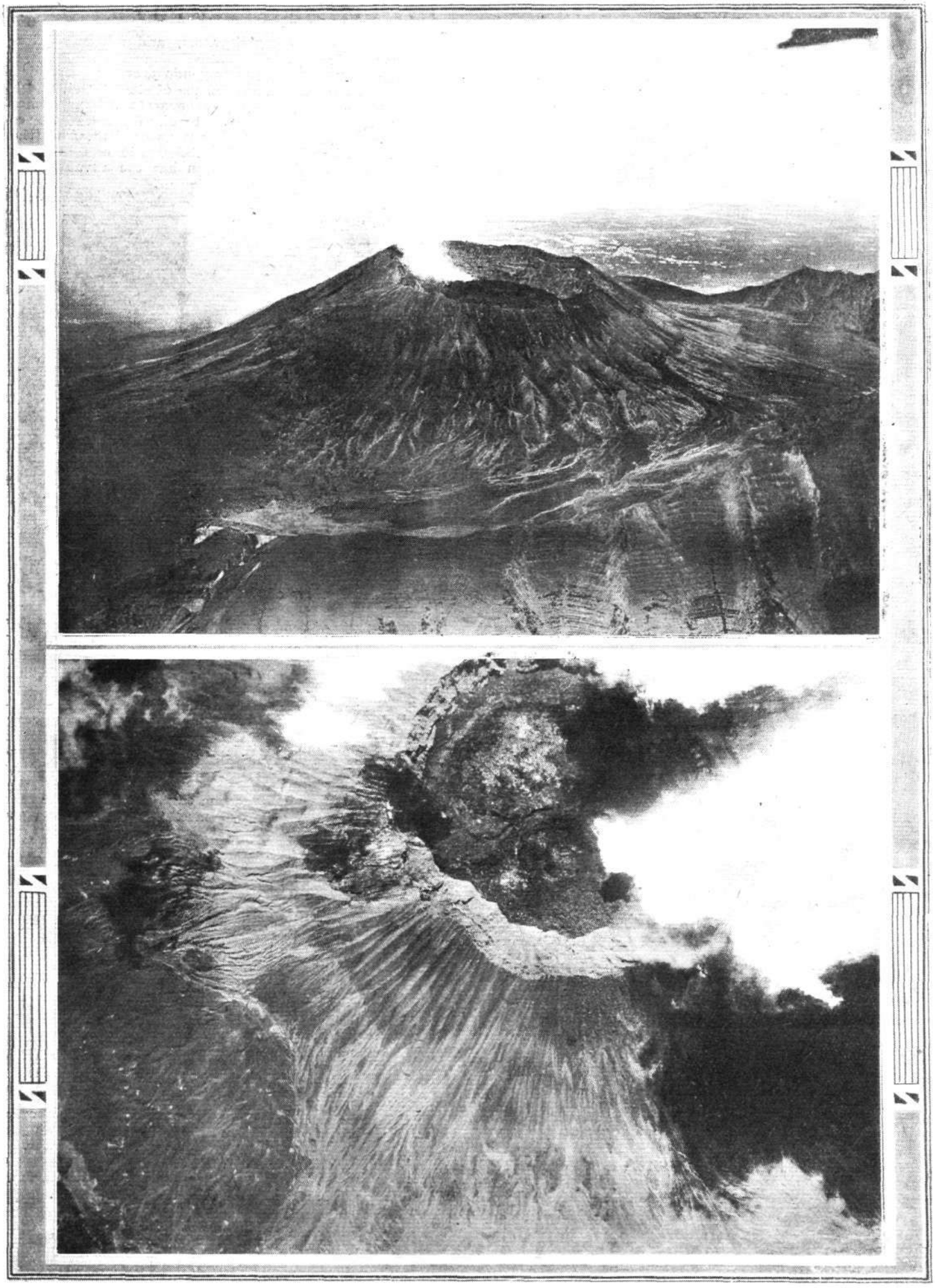
The special fee payable (inclusive of inland as well as air conveyance, but exclusive of express delivery, for which the fee is 6*d.* per parcel) will be:

For parcels not exceeding—

	2 lb.	7 lb.	11 lb.
	s. d.	*s. d.*	*s. d.*
Germany	3 6	6 0	8 6
Denmark	3 9	6 6	9 6
Norway and Sweden	4 0	7 0	10 6

In the existing air parcel service to Holland non-express parcels will as from to-day be accepted at the scale of fees hitherto applicable only to "poste restante" parcels, viz., in parcels weighing up to 3 lbs., 3*s.*, 3 lbs. to 7 lbs., 6*s.*, 7 lbs. to 11 lbs., 8*s.* 6*d.* If express delivery is desired the usual additional fee of 6*d.* per parcel must be paid.

In each of the above-mentioned air parcel services, except that to Germany, cash-on-delivery parcels and those on which the sender wishes to pay Customs charges will be admitted. Insured parcels will not, however, be admitted. Further particulars of these letter and parcel air mails, and of the advantages which they offer, will be found in a supplement to the current air mail leaflet, which may be obtained on application at any head post office, or to the Secretary, Air Mails, General Post Office, London, E.C.1. A new air mail leaflet will be issued as soon as possible.



Photos. Press Bureau Aéronautique Italienne.

MOUNT VESUVIUS FROM THE AIR: Two views of this famous "safety valve" taken from an Italian aeroplane. Above, approaching the volcano. Below, looking down into the crater—note the seething mass of lava.

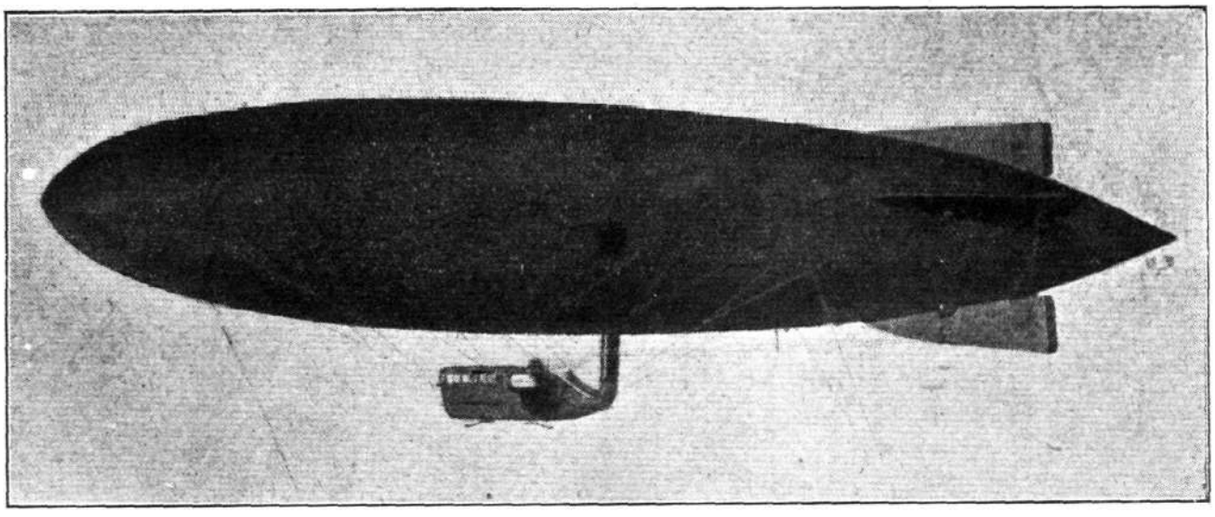
THE FRENCH ZODIAC DIRIGIBLE "VEDETTE"

ONE of the oldest and most successful of the French dirigible constructors is the "Zodiac" firm (Anciens Établissements Aéronautiques Maurice Mallet) of Puteaux. This firm recently produced a "scouting" dirigible for the French Navy which was officially adopted by the latter last year. During the recent naval operations at Cherbourg this airship put up an exceptionally good performance, especially as regards speed and manœuvrability.

While following the main characteristics of previous Zodiac practice, the Zodiac "Vidette," or V.Z.24, embodies many detail improvements—the result of past experience. It is, as in all other Zodiac airships, of the non-rigid type, and is the largest of its series—previous models having had a capacity of 3,500 cub. m., whereas the "Vidette" has 4,000 cub. m. capacity. The hull is comparatively long in proportion to its maximum diameter, but is nevertheless of good streamline form. Its overall length is 58·130 m. (190 ft. 6 ins.), and the maximum diameter 11·800 m. (38 ft. 9 ins.). The envelope is constructed of two-ply rubberised fabric, the nose being strengthened and stiffened by means of wooden ribs and ply-wood. The correct shape of the hull is maintained by means of an air ballonnet located within the envelope, at the bottom and in the centre of the latter. Air pressure for the ballonnet is supplied by means of a movable air scoop, the mouth of which may be placed behind one or the other of the two air-screws, and thus collects a stream of air from the slip-stream of the air-screw. An auxiliary centrifugal air pump or blower is also provided—in the event of engine failure, this pump being driven by a 6 h.p. Anzani engine. Engine and pump are located in the rear of the nacelle or car, from the end of which extends the air pipe. The ballonnet, which has a capacity of 1,350 cub. m. (47,682 cub. ft.), is provided with a relief valve The main envelope is fitted with two gas valves.

The tail surfaces are of cruciform arrangement, and are of thick section built up of tubular duralumin. Opposite surfaces are braced by struts, so that in the event of low pressure in the envelope any deformation of the tail surfaces is prevented. Rudders and elevators are unbalanced and are hinged to the trailing edges of their respective fins. All the tail surfaces—rudders, elevators, and fins are interchangeable.

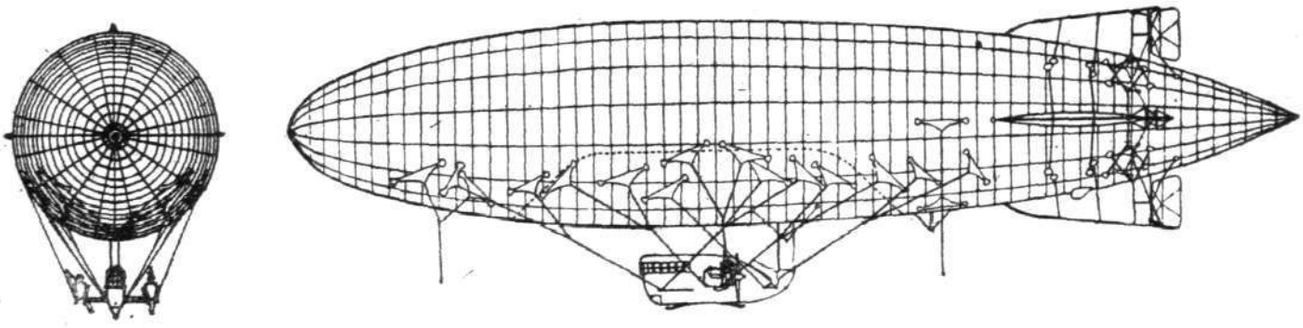
In the V.Z.24 there is one main gondola, or car, suspended below the centre of the hull by means of steel cables, which are attached to the envelope by separate bridge-patches so disposed along the envelope as to distribute the stresses as evenly as possible. Although not as efficient, from the point of view of resistance, as obtaining in certain other dirigibles, this system of suspension has the advantage of simplicity.



THE FRENCH ZODIAC DIRIGIBLE "VEDETTE": General view of the airship in flight.

The gondola is of good streamline form, and is built up of welded steel tubes. It comprises a main girder or keel of triangular section, on the upper portion of which is built up the large and comfortable cabin. The latter is divided up as follows, from front to rear: The pilot's and navigator's compartment; the observer's section; the wireless compartment; engine nacelle-attachments and bomb-dropping gear; mechanic's post. Windows are provided in the forward half of the cabin, and at the bottom of the gondola are two elastic skids which serve as shock-absorbers when landing and thus protect the main keel.

Extending laterally outwards on each side and at the rear of the gondola are two engine-nacelles, each containing a 150 h.p. Hispano-Suiza engine driving a pusher air-screw direct. The nacelles are braced to the gondola by duralumin tubes. Mounted above each engine is a Lamblin radiator.



THE FRENCH ZODIAC DIRIGIBLE "VEDETTE": Side and front elevation.

The principal characteristics of the V.Z.24 are as follows:

Capacity	4,000 cub. m. (141,280 cub. ft.).
Overall length	58·130 m. (190 ft. 6 ins.).
Overall diameter	11·800 m. (38 ft. 9 ins.).
Weight empty	3,025 kgs. (6,670 lbs.).
Useful load	1,335 kgs. (2,944 lbs.).
Useful load includes:—	
Crew	360 kgs. (794 lbs.).
Fuel	400 kgs. (882 lbs.).
Wireless	40 kgs. (88·2 lbs.).
Armament	165 kgs. (364 lbs.).
Accessories	60 kgs. (132 lbs.).
Ballast	310 kgs. (683·5 lbs.).
Speed range	80-85 km.p.h. (49·6-52·7 m.p.h.)

FLIGHT
THE AIRCRAFT ENGINEER IN AIRSHIPS

THE BRITISH AIRCRAFT INDUSTRY

BEING A SPECIAL CONTRIBUTION TO "FLIGHT" IN CONNECTION WITH THE PRAGUE AERO SHOW

·· 1924 ··

THE BRITISH AIRCRAFT INDUSTRY

Brief Biographical and Historic Sketch

[In the following notes we have attempted to set out, for the benefit of our Czechoslovak readers, a very brief outline of the past history and present activities of the various British aviation firms and aero engine firms, with a short reference to the personalities responsible for the conduct of the firms. To our British readers this section of our special Supplement may appear somewhat superfluous, but it should be remembered that the Central European nations have not had quite the same opportunity to become intimately acquainted with the history and doings of the firms of which the British aircraft industry is composed.—ED.]

BRITISH AIRCRAFT FIRMS

The Aircraft Disposal Co., Ltd.

Head Office: Regent House, Kingsway, London, W.C. 2.
Works: Waddon, Croydon, Surrey.

When the Aircraft Disposal Company was founded a few months after the Armistice, enormous stocks of Government surplus aircraft, aero engines and equipment were taken over, and the first thing to be done was to evolve order out of the chaos existing at the time. Within a comparatively short period Major J. R. Grant, who is manager of the Waddon depot, had succeeded in so arranging the enormous stocks that any machine, engine or piece of equipment could be instantly drawn from stock.

A rigorous system of inspection has been instituted whereby each machine which is to be overhauled has all the fabric stripped off and every part and fitting thoroughly examined, any faulty part being replaced by a new one. The same thorough inspection is devoted to the aero engines, which are dismantled, examined, and any defective parts scrapped. The engine is then re-erected and is given a test run before leaving the factory.

With such care bestowed upon re-conditioning of machines and engines, it is scarcely to be wondered at that the Aircraft Disposal Company has established an excellent reputation, and under the energetic leadership of Colonel M. O. Darby, managing director of the firm, Aircraft Disposal Company machines have been supplied to a very great number of different nations. In fact, except for the few large countries who have kept well to the fore in aircraft construction ever since the early days, it is fairly safe to say that there is hardly a country to which this firm has not supplied British machines.

A few months ago the Aircraft Disposal Company took over the name, goodwill and manufacturing rights of Martinsyde Aeroplanes, and it is understood that the firm will soon be in a position to undertake the construction of aircraft of original design. Apart from the re-conditioned war-time types of machines, the Aircraft Disposal Company also act as selling agents for quite a large number of the British aircraft firms.

The Air Navigation and Engineering Co., Ltd.

Head Office and Works: Addlestone, Surrey.

This firm was known in earlier times as Bleriot Aeronautics, and started work in a small factory building on the Brooklands aerodrome just before the war. During the war the firm was busily engaged upon the construction of Bleriot and Spad machines and other types, and the Brooklands works soon became too small. The firm's activities were then transferred to the present factory at Addlestone, where a great number of machines were produced. The name was changed from Bleriot Aeronautics to the present title, but the managing director of the firm is still Mr. Norbert Chereau.

Among the machines constructed by this firm in recent times mention may be made of the Handasyde commercial monoplanes, the Handasyde light monoplane, built for the 1923 competitions, and the A.N.E.C. light monoplanes, which did so well in the competitions at Lympne last year. The firm has also acquired the British rights for the special forms of metal construction evolved by the Bleriot factories in France.

Sir W. G. Armstrong, Whitworth Aircraft, Ltd.

London Office: 10, Old Bond Street, W.1.
Works: Coventry.

Some slight confusion might easily be caused by the similarity in title of Sir W. G. Armstrong Whitworth Aircraft, Ltd., and Armstrong Siddeley Motors, Ltd. Briefly explained, the position is this, that Armstrong Siddeley Motors, Ltd., is allied with Sir W. G. Armstrong Whitworth and Co., Ltd., whose aircraft section has been transferred to Coventry, and whose machines are known as Armstrong Whitworth aircraft. Mr. J. D. Siddeley is Managing Director of both firms, but there is a separate designing and works staff for the aircraft and for the aero engine section.

Mr. Siddeley made his first entry into aviation during the war by producing the now famous Siddeley "Puma" engine. It was not until towards the end of the war that Armstrong Siddeley Motors, Ltd., established an aircraft department, and this has now, as already explained, become known as Sir W. G. Armstrong Whitworth Aircraft, Ltd. This firm has produced a considerable number of different types of machines, some of which are illustrated and described in another section of this article. It may be mentioned that the firm is now developing special forms of metal construction, and that considerable success has already been attained.

Wm. Beardmore and Co. Ltd.

Head Office and Works: Naval Construction Works, Dalmuir, Dumbartonshire, Scotland.

The famous armament firm of Beardmores will be well known to our Czechoslovak readers, but it may be pointed out that the two sections dealing with aircraft and aero engines are situated at Dalmuir and Glasgow, respectively. With regard to the aircraft section, this was busily engaged during the war upon the construction of machines of various types, but during the years following the war, this section of the great firm was allowed to lie idle, and it was not until quite recently that it has been decided to resume aircraft design and construction. Mr. W. S. Shackleton, the designer of the successful A.N.E.C. light monoplanes, has now joined Beardmore's as Chief Designer, and has already commenced the construction of one or two new types, while others are still in the design stage only.

The Blackburn Aeroplane and Motor Co., Ltd.

London Office: Amberley House, Norfolk Street, Strand, W.C.2.
Head Office and Works: Olympia, Leeds.
Seaplane Base: Brough, near Hull.

Mr. Robert Blackburn, the founder and head of the Blackburn Aeroplane and Motor Co., Ltd., is one of the pioneers of British aviation, having built his first aeroplane in 1909. From that date until the present time the history of Blackburn aircraft has been one of steady progress. During the war the firm built at first various types of machines under licence. It was not long, however, before they turned their attention to original design, and a number of different types were produced, both seaplanes and land machines. Of recent years the Blackburn Aeroplane and Motor Co. have specialised in torpedoplanes, and one of these, the "Dart," will be shown at the Prague Aero Show, where consequently Czechoslovak readers of FLIGHT will have an opportunity of examining the machine for themselves.

Boulton and Paul, Ltd.

London Office: 135-137, Queen Victoria Street, E.C. 4.
Head Office and Works: Norwich, Norfolk.

Boulton and Paul, Ltd., of Norwich, is a very old firm of general engineers, who first took up aircraft construction during the war, commencing by building F.E.2b machines designed by the Royal Aircraft Factory. A large number of machines of various types were constructed during the war, and it was then decided to get together a staff capable of original design. Mr. J. D. North was engaged as Chief Engineer and Designer, and has remained with Boulton and Paul, Ltd., in that capacity ever since.

Mr. North, who was a trained engineer before he turned his attention to aviation, soon became convinced that metal aircraft construction was the thing of the future, and he succeeded in getting his firm to see eye to eye with him in this matter. The consequence was that the huge plant established during the war for the production of the usual composite wood and metal type of aircraft was scrapped, and the aircraft section became devoted entirely to the subject of all-metal construction. For the last five or six years novel methods have been evolved, the firm having spent a very great deal of time and money in discovering the best ways of employing metal to the best advantage. So successful have they been

that it is no exaggeration to say that Boulton and Paul, Ltd., now hold a leading position in this very specialised form of construction. It should be noted that the metal employed is high-grade steel, and not duralumin, Boulton and Paul construction differing entirely from the methods adopted by many French and German aircraft constructors.

The Bristol Aeroplane Co., Ltd.

Head Office: Filton House, Bristol.
Works: Filton, Bristol.

The Bristol Aeroplane Co. was formed in 1909 by the late Sir George White, Bart., and this is one of the oldest aircraft firms in Great Britain. The firm commenced by building biplanes of the Farman type, but soon established a designing office of its own, from which a long series of successful machines has issued. Among the most famous types built during the war was the Bristol fighter F.2b. Since the war the firm has produced many excellent types of machines, some of which will be found described in the various sections of the Supplement.

The Managing Director of the Bristol Aeroplane Co., Ltd., is Sir G. Stanley White, Bart., son of the late Sir George White, Bart., and the Chairman is Mr. Samuel White, J.P. Sir Henry White Smith is a Director and Secretary of the company, and Capt. F. S. Barnwell is Chief Engineer and Designer.

The De Havilland Aircraft Co., Ltd.

Head Office and Works: Stag Lane Aerodrome, Edgware, Middlesex.

Capt. Geoffrey de Havilland is one of the pioneers of British aviation, and is moreover one of the most successful of modern aircraft designers. He started designing and building aeroplanes round about 1909, and was then given a post at the Royal Aircraft Factory, where he designed the original B.E. Shortly after the outbreak of war, Capt. de Havilland joined the Aircraft Manufacturing Co., and produced the series of famous military machines that made history during the war.

After the war, when the Aircraft Manufacturing Co. closed down, Capt. de Havilland established his present firm, in which he has the assistance of Mr. C. C. Walker, as Chief Engineer, with Mr. Hagg in charge of the drawing office and Mr. F. N. St. Barbe as business manager. One of the directors of the firm is Mr. A. Butler, who is at present touring Europe in his private aeroplane.

The English Electric Co., Ltd.

Head Office: Queen's House, Kingsway, London, W.C. 2.
Works: Preston, and Lytham, Lancashire.

The English Electric Co. is a very large concern with works at Bradford, Coventry, Preston, Rugby and Stafford, but the aircraft section, with which we are concerned, is established at Preston, Lancashire. The firm specialises in flying-boats, but their Chief Designer, Mr. W. O. Manning, was also the designer of the famous Wren which was the first British light 'plane ever to be built.

The Fairey Aviation Co., Ltd.

Head Office: Hayes, Middlesex.
Works: Hayes, Middlesex and Hamble, near Southampton.

The Fairey Aviation Co., Ltd., was founded in 1915 by Mr. C. R. Fairey, who had previously been on the technical staff of Short Bros. at Rochester and Eastchurch. The Fairey Aviation Co. has produced a number of different types both during the war and since the war, and is at present one of the busiest aircraft factories in Great Britain. A number of Fairey machines will be found described elsewhere, and it will be seen that Mr. Fairey concentrates particularly on seaplane work, although he has produced very fine land machines also. Incidentally, it may be mentioned that Mr. Fairey is Chairman of the Society of British Aircraft Constructors. Mr. Fairey in addition to being Chairman of his firm, is also its designer and Chief Engineer, his Chief Assistant being Mr. F. Duncanson, with Mr. A. C. Barlow as Chief Draughtsman.

The Gloucestershire Aircraft Co., Ltd.

Head Office and Works: Cheltenham, Gloucestershire

Founded as an aircraft firm in 1915, the Gloucestershire Aircraft Co. at first built machines to Government design. At the end of the war Mr. A. W. Martyn and Mr. David Longden decided to become permanently active members of the aircraft industry, and consequently the services of Mr. H. P. Folland were secured for the post of chief engineer and designer. Mr. Folland had previously acted in the same capacity for the British Nieuport Co. and has produced a number of very interesting types since joining the Gloucestershire Aircraft Company. It should be mentioned that in addition to military and commercial types of machines, the Gloucestershire Aircraft Co. has always been well to the fore in the design and construction of racing machines, and for several years their racing machines have been the fastest British aeroplanes in existence.

The H. G. Hawker Engineering Co., Ltd.

Head Office and Works; Canbury Park Road, Kingston-on-Thames.

The Hawker Engineering Co., Ltd., was formed in 1920 from the nucleus of the old Sopwith concern, with Mr. T. O. M. Sopwith, C.B.E., and Mr. F. Sigrist as managing directors. The firm is carrying on a great deal of experimental work, but about this no information may be published. It may be stated, however, that a number of machines of different types are now nearing completion, among which may be mentioned the "Woodcock," a special night-flying single-seater fighter with Bristol "Jupiter" engine. The "Duiker" is illustrated elsewhere. One machine is a high performance single-seater scout of quite remarkable performance, whilst another machine is a three-seater reconnaissance type incorporating in its detail design several novel features. The firm is also building a light 'plane for the 1924 Air Ministry competitions.

Handley Page, Ltd.

Head Office and Works: Cricklewood, London, N.W.2.

Mr. F. Handley Page is one of the pioneers of British aircraft constructors, having built his first machine in 1909. Probably Mr. Handley Page is best known outside the British Empire for his large twin-engined bombing machines. Since the war Handley Page, Ltd., have produced several types of military and commercial machines, and some of the latest types are being fitted with the Handley Page slotted wing, from which great things are expected.

George Parnall and Co.

Head Office and Works: Coliseum Works, Park Row, Bristol.

Founded during the war by the present proprietor, Mr. George C. Parnall, this firm has specialised particularly on seaplanes, amphibians and ship planes, although recently certain other types have also been developed. Mr. Parnall's chief designer, Mr. H. Bolas, has very original ideas on the subject of aircraft design, and the firm is at present busily engaged on certain very interesting experimental work in connection with Air Ministry types.

A. V. Roe and Co., Ltd.

Head Office: Newton Heath, Manchester.
London Office: 166, Piccadilly, W.1.
Works: Manchester and Hamble, near Southampton.

To Mr. A. V. Roe can truly be applied the name of pioneer, not only as a pioneer of British aviation, but of aviation in general. To Mr. A. V. Roe belongs the credit of having introduced the tractor type of machine which now holds the field almost to the exclusion of all other types. A. V. Roe and Co. have produced a very long series of machines both during the war and after, and one of their machines—the Avro "Lynx"—will be exhibited at Prague. The chief engineer and designer of the Avro firm is Mr. Roy Chadwick, who has been associated with Mr. A. V. Roe since the very earliest days. Mr. R. J. Parrott is general manager of the Hamble establishment.

S. E. Saunders, Ltd.

Head Office and Works: East Cowes, Isle of Wight.

Mr. S. E. Saunders is one of the best known British designers and constructors of racing motor boats, and during the war his aviation department produced several types of machines. More recently the Cowes works have built the Vickers-Saunders "Valentia," a large twin-engined flying-boat. Quite recently Mr. Saunders has re-organised his aircraft department, and it is expected that before long some very interesting types of machines will be produced. Mr. Saunders is the inventor of the "Consuta" form of plywood, in which two layers of wood are cemented together and afterwards stitched with hemp thread.

Short Brothers, Ltd.

London Office: Whitehall House, 29-30, Charing Cross, London, S.W. 1.
Works: Rochester, Kent.

One of the first British aircraft firms to be established was that of Short Brothers, who commenced their activities as aeroplane and seaplane constructors in 1909, at Eastchurch, Isle of Sheppey. Three brothers were originally interested in the undertaking, one of whom, Mr. Horace Short, died some

years ago. The firm is now being carried on by Mr. Oswald Short and Mr. Eustace Short.

During the war the firm produced a large number of twin-float seaplanes, which did excellent service in the Royal Naval Air Service. They also built rigid airships at their works at Bedford. Since the war, Mr. Oswald Short has turned his attention to all-metal construction, and produced the first British all-metal machine, the "Silver Streak," in 1920. Several modern types of similar construction are now being built.

The Supermarine Aviation Works, Ltd.

London Office: Broadway Court, Broadway, Westminster, S.W. 1.

Head Office and Works: Southampton.

The Supermarine Aviation works were founded by Mr. N. Pemberton Billing in 1912. Mr. Pemberton Billing has long since severed his connection with the firm, which has for several years been carried on by Mr. Hubert Scott-Paine and Commander J. Bird. It may be mentioned that some months ago Mr. Scott Paine severed his connection with the firm in order to devote himself to the development of the British Air Navigation Co., Ltd., also of Southampton, which is one of the four firms absorbed into the new Imperial Air Transport Company.

The Supermarine Aviation Works have the distinction of being the only firm in Great Britain to devote their energies entirely to the production of flying-boats, and the firm has always kept as its motto "Not an aeroplane that will float, but a seaworthy boat which will fly," and seaworthiness has always been a feature of all Supermarine flying-boats. It may be mentioned that Supermarine flying-boats are to be found in all parts of the world, and that everywhere they are giving a good account of themselves.

BRITISH AERO ENGINE FIRMS

Armstrong-Siddeley Motors, Ltd.

Head Office and Works: Coventry.

Reference has already been made to the relationship between Sir W. G. Armstrong Whitworth Aircraft, Ltd., and Armstrong-Siddeley Motors, Ltd. With regard to the aero engines, the "Jaguar" and "Lynx" have now passed through the experimental stage and are being employed extensively in the machines of the British Royal Air Force, where they have an excellent reputation.

Wm. Beardmore and Co., Ltd.

Head Office and Works: Glasgow.

The aero engine section of this firm built large numbers of 6-cylinder vertical water-cooled engines during the war, and the latest development is a semi-Diesel type of aero engine, a photograph of which will be found in another section. This engine may be said to mark a new milestone in the progress in aviation, not only in British aviation but in world aeronautics. It is regretted that at the moment details of this interesting engine are not available.

The Bristol Aeroplane Co., Ltd.

Head Office and Works: Filton, Bristol.

The aero engine section of this firm has been built up of fairly recent years, the Bristol Aeroplane Co. having taken over the patents, etc., of the Cosmos Engineering Co., and also the services of that firm's chief designer, Mr. Roy Fedden. With the better manufacturing facilities of the Bristol Aeroplane Co., development has been rapid, and Mr. Fedden has now designed, and the Bristol firm manufactured, three distinct types of engine, all of which are dealt with in another section. The Bristol engines have, of course, passed the very strenuous Air Ministry type tests, and the general excellence of the design, as well as of the workmanship, is admitted on all sides.

The Fairey Aviation Co., Ltd.

Head Office and Works: Hayes, Middlesex.

Some time ago Mr. C. R. Fairey obtained the British manufacturing rights for the Curtiss *D.12* aero engine of 500 h.p., which will shortly be manufactured in Great Britain. At the moment it is not decided whether the engine, which will be known here as the Fairey "Felix," will be manufactured at the Hayes works of the Fairey Aviation Co. or elsewhere.

D. Napier and Son, Ltd.

Head Office: 14, New Burlington Street, London, W.1.

Works: Acton, London, W.3.

Certainly one of the most famous aero engines in the world is the Napier "Lion," which is the engine that has done most of the flying on the British air routes, and which is being employed in increasing numbers by the Royal Air Force and by a great number of foreign governments. The "Lion" has also been used with great success in many racing aircraft. More recently Napiers have produced the 1,000-h.p. "Cub," which has passed its type tests and is now being used on several types of British military aircraft. This is the most powerful aero engine in the world to have been put into actual service. Both engines were designed by Mr. A. J. Rowledge. Another engine, the "Lioness," is now in course of development.

Rolls-Royce, Ltd.

London Office: 14-15, Conduit Street, London, W.1.

Works: Derby.

The Rolls-Royce aero engines, like the Rolls-Royce cars, are famous for the soundness, solidity and reliability of their construction. The "Eagle VIII" has been sold to nearly all the civilised nations in the world, and later types, such as the "Eagle IX" and the "Condor," give every promise of equalling the fame of the original engine. It will be recalled that all the long-distance British flights, such as the trans-atlantic, the London-Australia, the England-South Africa, and the Portugal-South America flights, and more recently the flight around Australia, were made with machines fitted with Rolls-Royce engines.

The Sunbeam Motor Car Co., Ltd.

Head Office and Works: Wolverhampton.

The Sunbeam engines were all designed by Mr. L. Coatalen, whose work in connection with the famous Sunbeam motor cars will be well known. The aero engines of the Sunbeam Co. are rarely seen on aeroplanes nowadays, but have been extensively used for airship work, and as the British Government has decided to resume airship construction, it seems likely that Sunbeam engines may come to the fore again.

BRITISH LIGHT 'PLANE ENGINE FIRMS

Burney & Blackburne, Ltd.

Office and Works: Bookham, Surrey.

This firm are the makers of the Blackburne engines which did so well in the light 'plane competitions at Lympne last year. In addition to the standard engine, known as the "Tomtit," a three-cylinder radial engine is being produced for the competitions that are to take place at Lympne in September of this year.

The Coventry Victor Motor Co., Ltd.

Office and Works: Coventry.

The standard business of this firm is the manufacture of cycle and boat engines. Recently, however, the firm has produced a two-cylinder flat twin air-cooled engine for light 'planes. A photograph of this engine is published elsewhere, but at the moment no particulars are available relating to the engine.

Vickers, Ltd.

Head Office: Vickers House, Broadway, Westminster, London, S.W. 1.

Works: Weybridge, Surrey.

The famous armament firm of Vickers, Ltd., is too well known to need any introduction to readers of FLIGHT. The Aviation Department was established several years before the war, and was originally under the management of the late Major Wood. The present manager of the aviation department is Capt. P. D. Acland, under whose energetic leadership Vickers aircraft are becoming familiar to most of the nations of the world. The chief engineer and designer of Vickers' Aviation Department is Mr. Rex. Pierson, who has produced an imposing series of widely different types of machines, many of which are described and illustrated in this issue. It will be recollected that the flight across the Atlantic, the London-Australia flight, and the Cairo-Cape flight, were all carried out on Vickers aeroplanes.

The Westland Aircraft Works.

Head Office and Works: Yeovil, Somerset.

Founded in 1915, as a separate branch of Petters, Ltd., of Yeovil, by Mr. R. A. Bruce, who is also managing director of Petters, Ltd., the Westland Aircraft Works, commenced, like so many other firms, by building aircraft under licence. It was not, however, very long before Mr. Bruce and his chief assistant designer, Mr. A. Davenport, commenced the design of original machines, and several of these have been produced, since the war, such as the "Wagtail," the "Weasel," and the "Walrus." Several commercial types have also been produced, of which one, the Westland Limousine six-seater, won the Air Ministry competition for Commercial Aeroplanes in 1920. At present the firm is busily engaged on experimental work for the British Air Ministry, among the machines under construction being some of very unorthodox design.

CLASSIFIED INDEX TO BRITISH AIRCRAFT

The index to British aeroplanes, seaplanes, and amphibians published below has been arranged so as to facilitate ready reference, the various machines being grouped according to type. Thus a reader who is interested in some one particular type of machine need only refer to the heading for that type, under which he will find all British machines falling under that category. The figures in parentheses, following the name of a machine, indicate the page on which will be found a reference to, or illustration of, that aircraft. The machines have first been divided into two main groups: Military (including naval) aircraft, and civil aircraft. Each of these two groups has then been subdivided into three sections: Aeroplanes, seaplanes, and amphibians, with a still further sub-division into types under the various groups. In the case of aero engines it has not been possible to carry out a corresponding classification, as nearly all the aero engines illustrated are used on all the different types of aircraft.

BRITISH MILITARY (INCLUDING NAVAL) AIRCRAFT

AEROPLANES

Single-seater Fighters

Armstrong-Whitworth "Siskin" (307).
Bristol "Bullfinch" (311)
Gloucestershire "Mars II" (315), Gloucestershire "Mars VI" (315).
Gloucestershire "Grebe" (314).

Two-seater Fighters

Bristol "Jupiter-Fighter" (311).
Fairey "III D-Napier" (313).
Vickers "Vixen" (323).
Vickers "Valparaiso" (322).
Vickers "Venture" (327).
Westland "Weasel." (326).

Single-seater Ship Fighters

Fairey "Flycatcher" (313).
Gloucestershire "Grouse" (316).
Parnall "Plover" (317).

Two-seater Corps Reconnaissance

Armstrong-Whitworth "Wolf" (307).
Hawker-Sopwith "Duiker" (316).
Short "Springbok" (320).

Two-seater Long Reconnaissance

Fairey "Fawn" (314).

Three-seater Long Reconnaissance

Boulton and Paul "Bolton."
Boulton and Paul "Bourges" (310).

Three-seater Medium Range Postal

Boulton and Paul "Bodmin" (309).
Parnall "Possum" (317).

Three-seater Long-distance Bombers

De Havilland "Derby."
De Havilland "Doncaster."
Avro "Aldershot" (318).

Four-seater Long-distance Bombers

Vickers "Virginia" (322).

Four-seater Fleet Gunnery Spotters

Blackburn "Blackburn" (309).
Avro "Bison" (318).
Westland "Walrus" (326).

Single-seater Torpedo Carriers

Blackburn "Dart" (309).
Blackburn "Swift" (308).
Handley Page "Hanley" (317).

Troop Carriers

Armstrong-Whitworth "Awana" (307).
Vickers "Vernon" (323).
Vickers "Victoria" (323).

SEAPLANES

Twin-float Reconnaissance

Fairey "III D" (313).

Flying-boat Seaplanes

English Electric "Cork" Five-seater Reconnaissance.
English Electric "Ayr" Four-seater Experimental (312).
English Electric "Kingston" Five-seater Reconnaissance (312).
Fairey "Atalanta" Six-seater Open-sea Reconnaissance (312).
Fairey "Titania" Six-seater Open-sea Reconnaissance
Vickers-Saunders "Valentia" Five-seater Long-distance Reconnaissance (320).

Amphibians

Fairey "Flycatcher" Twin-float Single-seater Ship Fighter (314).
Supermarine "Sea Lion" Single-seater Ship Fighter (321).
Supermarine "Seagull" Three-seater Fleet Spotter (321).
Supermarine "Swan" Twin-engined Amphibian (322).
Vickers "Vanellus" Three-seater Fleet Spotter (326).
Vickers "Viking" Three-seater Fleet Spotter (323).

BRITISH CIVIL AIRCRAFT

Commercial Aeroplanes

Bristol 10-seater (327).
De Havilland 34 (328).
De Havilland 50 (328).
Gloucestershire "Mars VIII" (329).
Handley Page "W 8 B" (329).
Handley Page Three-engined (329).
Vickers "Vimy-Commercial" (330).

Commercial Seaplanes

Supermarine "Sea Eagle" (329).
Vickers "Viking-Commercial" (330).
Vickers "Vulture" (330).

Sporting and School Aeroplanes

Bristol "Lucifer" (327).
Gloucestershire "Grouse" (316).
"Avro-Lynx" (319).

Racing Aeroplanes

Gloucestershire "Mars I" (329).
Gloucestershire "Gloster" (328).

Racing Flying Boat

Supermarine "Sea Lion" (321).

"FLIGHT" AT THE PRAGUE AERO SHOW.

This and next week's issues of "FLIGHT" will be on sale at the Prague Aero Exhibition, on the stand of our Czech contemporary "Letectvi." Copies will also be distributed to all the main stands at the Exhibition, and "FLIGHT" will be obtainable in the city itself, and will be found at all the more important hotels in Prague.

BRITISH AIRCRAFT TYPES

[IN order to facilitate reference, the machines illustrated and described in this section of FLIGHT have been classified under two separate heads—"Military Aircraft," including both land machines and seaplanes designed for warlike operations; "Civilian Aircraft," intended for commercial flying, sporting aviation, and school work. Military types will be dealt with first, and then the civilian machines, which are fewer in number. In the section dealing with British aero engines it has not been possible to make a distinction between military and commercial types, as at the moment any one type of engine may be, and in most cases is, used for both purposes. The only classification possible is one dividing the types into large aero engines, for military and civilian use, and light 'plane engines suitable for the lowest-powered machines. The titles of firms exhibiting at Prague are marked with a *.—ED.]

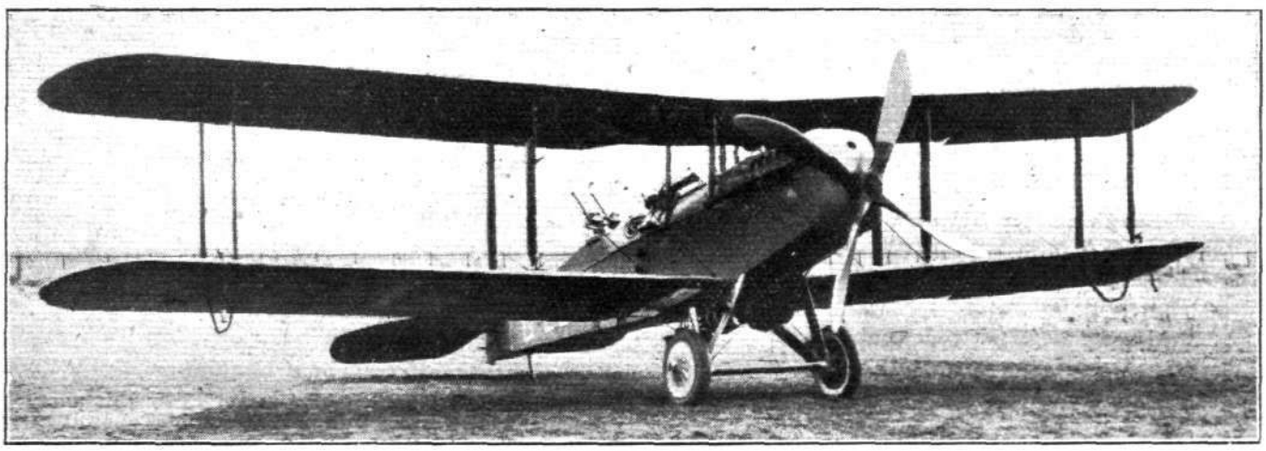
BRITISH MILITARY AIRCRAFT

AIRCRAFT DISPOSAL CO., LTD.

So many types of machines and engines are being supplied by this firm that it has been impossible for us to include a representative collection of photographs and data. As, however, most of the machines and engines kept in stock by the A.D.C. are of well-known, not to say famous, types, this should not greatly matter, as most readers of FLIGHT will be familiar with them, and the mere mention of their names or type letters should suffice. Before proceeding to give a list of the various products obtainable from the A.D.C. it may be of interest to indicate briefly the system upon which the firm works. It is, of course, well known that on its formation the A.D.C. bought the entire stock of Government surplus aeroplanes, seaplanes, engines and spares. Work was then commenced, as outlined in the historical section of this article, to sort out all these types, re-arranging them so that they might easily be withdrawn from stock, and finally a plant was laid down for overhauling and re-conditioning the machines and engines. As a certain type of machine is required it is drawn from stock, the fabric is stripped from the fuselage and wings, and the most minute examination of every part, fitting, etc., is made. Any part found to have suffered from storage is replaced by a new one, and by the time the machine is finished it is to all intents and purpose a new aeroplane. The same rigorous inspection and overhaul is bestowed upon all engines, which are given a test run before being issued, just as all finished machines are given a series of test flights by the firm's test pilots before being packed for shipment to the purchaser. It will thus be seen that every care is taken to ensure that all flying stock sold by the A.D.C. is in first-class condition. It may be mentioned that a very large number of repeat orders have been and are being executed, affording proof that the first purchase was considered satisfactory.

As regards the different types of machines and engines supplied, it is not possible to give an exhaustive list, as not only are machines supplied from the A.D.C.'s own stocks, but the firm also acts as selling agents for a number of well-known British aircraft firms. Of the land machines which may be obtained from the A.D.C. mention may be made of the famous Martinsyde "F.4," with Hispano-Suiza engine, which is still one of the fastest machines for its power in the world. Another well-known type is the "D.H.9," with its modifications "9A" and "9B." The "9" is, of course, fitted with 240 h.p. Siddeley "Puma" engine, while the variations may be obtained with Liberty and Rolls-Royce engines. For training purposes, "joy-riding" or private sporting use, the Avro "504K," with Le Rhone engine, is supplied. The Sopwith "Snipe" single-seater fighter, with "B.R.2" rotary engine, is another type supplied by the A.D.C. Mention may also be made of the Bristol fighter "F.2B," and of the Parnall "Panther" ship's 'plane. A certain number of "F.3" flying boats, with Rolls-Royce engines, are still available.

Of aero engines supplied by the A.D.C. it will suffice to mention a few of the more pupular types—the 360 h.p. Rolls-Royce "Eagle VIII," the 300 h.p. Hispano-Suiza, the 240 h.p. Siddeley "Puma," the 210 h.p. Wolseley "Viper," the 160 h.p. Beardmore, the 400 "Liberty," the 200 h.p. "B.R.2" rotary, and the 110 h.p. Le Rhone rotary.



An Aircraft Disposal Co. D.H.9A, with Lamblin radiators.

In conclusion it should be mentioned that the A.D.C. does not intend always to confine its activities to selling machines of other people's design. The firm is at present being somewhat re-organised, and a designing staff is being got together, the intention being to commence producing original machines. Some little time ago the A.D.C. purchased the name, goodwill and manufacturing rights of Martinsyde aeroplanes, and it seems possible that a start may be made with modernised versions of machines of this type.

THE AIR NAVIGATION AND ENGINEERING CO., LTD.

UP to the present this firm, known once upon a time as Blériot Aeronautics, has not produced any aeroplanes of military type. They have, however, designed and built some very successful light monoplanes, one of which put up a splendid performance at Lympne in the 1923 Competitions. They have also built two or three commercial monoplanes for Mr. G. H. Handasyde.

SIR W. G. ARMSTRONG-WHITWORTH AIRCRAFT, LTD.*

BY the amalgamation of the aircraft section of Armstrong-Siddeley Motors, Ltd., and the Armstrong-Whitworth Company, the aircraft section of the latter has for some time been situated at Coventry, and here Armstrong-Whitworth aeroplanes are produced. One of the modern machines of this firm, the Armstrong-Siddeley "Siskin," will be exhibited at Prague, where consequently Czechoslovak readers of FLIGHT will be able to examine it for themselves. This machine is a single-seater fighter, fitted with Armstrong-Siddeley "Jaguar" radial air-cooled engine. Built very largely of metal, the "Siskin" impresses the onlooker as being a very fine example of structural design, while the arrangement of pilot's seat, guns and gun gear, controls, etc., is such as to make it a very fine machine for fighting. The pilot, being practically on a level with the top plane, has an excellent view,

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS

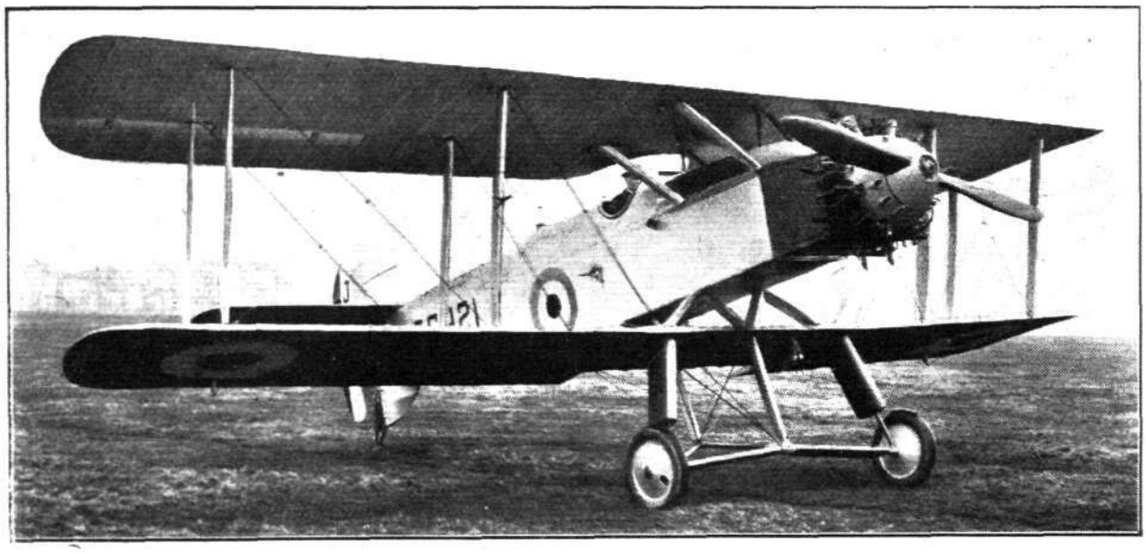
the machine guns are so placed as to be within easy reach, and large control surfaces render the machine very manœuvrable.

The "Jaguar" engine is mounted on a special steel cone mounting, provided as standard with the "Jaguar" engine. This mounting enables the engine to be removed from the machine in a minimum of time, without interfering with carburettor adjustments, etc., and its conical shape is, at the same time, very good for resisting torsional stresses, being very rigid for a minimum of weight. The engine is supplied with petrol from a gravity tank in the top plane, the fuel being pumped from the main tank in the fuselage to the service tank by a windmill-driven pump.

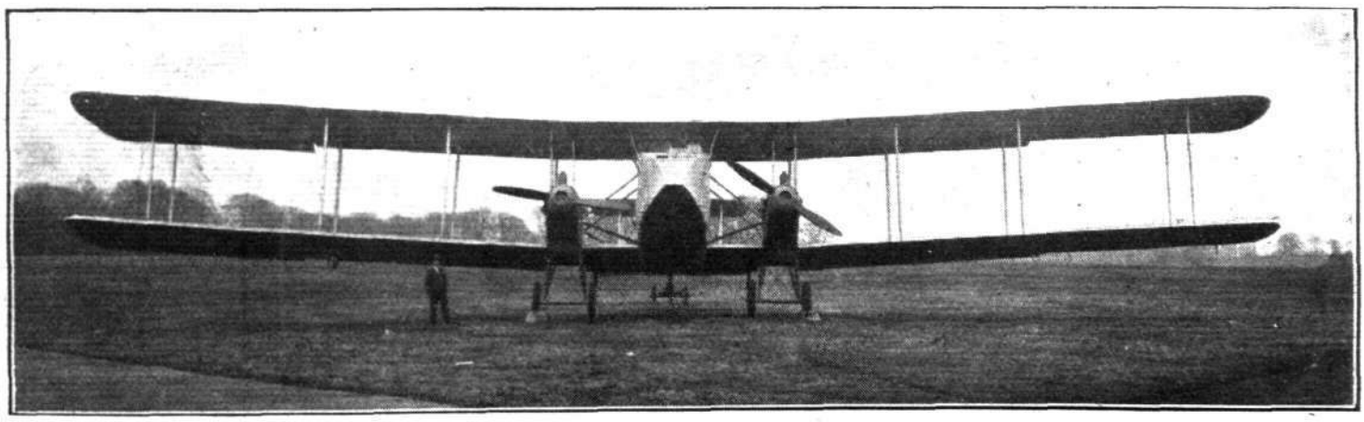
The undercarriage is of the oleo-pneumatic type, and a feature of it is that a very long travel of the wheels is permitted, thus lessening the shock to the structure of even a very rough landing.

The main dimensions of the "Siskin" are as follows: Length, o.a., 21 ft. 6 ins. (6·55 m.); span, 28 ft. 4 ins. (8·62 m.); wing area, 253 sq. ft. (23·5 m.²); weight, fully loaded, 2,250 lbs.; wing loading, 8·9 lbs./sq. ft. (18·2 kgs./m.²); power loading, 7 lbs./h.p. (3·18 kgs./h.p.). The normal load carried by this machine is 400 lbs. (182 kgs.), including 180 lbs. (81 kgs.) for the pilot, but exclusive of fuel, of which 40 gallons (181 litres) of petrol and 5 gallons (22

The Armstrong-Whitworth "Siskin" single-seater fighter (Siddeley "Jaguar" engine). One of these machines will be exhibited at Prague.



The Armstrong-Whitworth "Wolf" (Siddeley "Jaguar"), a two-seater Corps Reconnaissance machine.



The Armstrong-Whitworth "Awana" is a troop carrier, with seating capacity for 25 troops.

litres) of oil are carried. The maximum speed at ground level is 148 m.p.h. (238 kms./hour); at 3,000 m. it is 140 m.p.h. (225 kms.); and at 22,000 ft. (6,710 m.) it is 130 m.p.h. (209 kms.). The landing speed is 50 m.p.h. (80 kms.). The climb is as follows: To 3,000 m. in 8 mins.; to 6,700 m. in 25 mins. The ceiling is 7,950 m.

The Armstrong-Whitworth "Awana" is a very large twin-engined troop carrier, with accommodation for 25 troops, in addition to the pilot and engineer. The fuselage is built of steel tubing, while the wings have wood spars and ribs. The engines are Napier "Lions" of 450 h.p. each. The main dimensions of the "Awana" are as follows: Length, o.a., 68 ft. (20·7 m.); wing span, 105 ft. 6 ins. (32·2 m.); wing area, 2,300 sq. ft. (214 m.²). The weight empty is 10,000 lbs. (4,550 kgs.), and weight fully loaded 18,450 lbs. (8,400 kgs.). Speed at 3,000 ft. (1,000 m.), 97 m.p.h. (155 kms.).

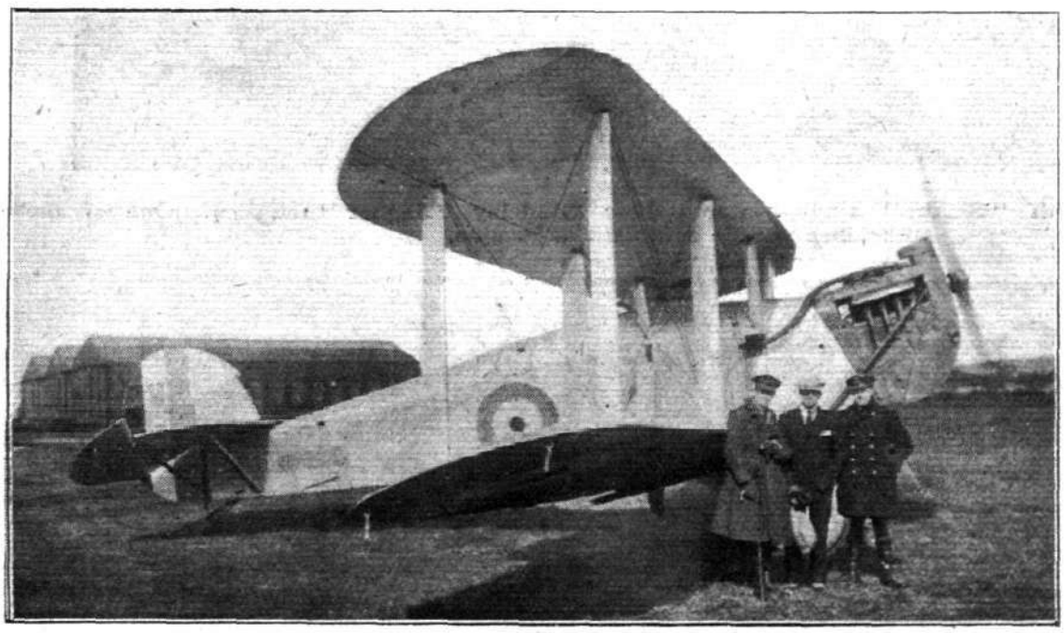
Another Armstrong-Whitworth machine is shown in a photograph. This is the "Wolf," a two-seater corps reconnaissance biplane with Armstrong-Siddeley "Jaguar" engine. As, however, this machine is built to the order of the British Air Ministry, it is not permissible to publish any details.

WILLIAM BEARDMORE AND CO., LTD.

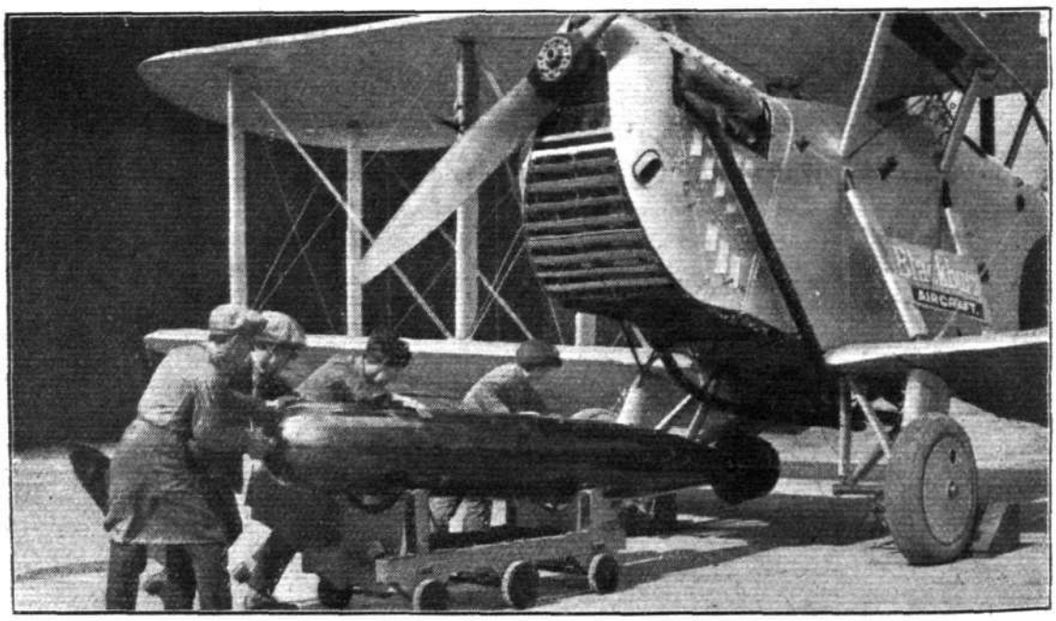
As indicated in the Historical Section, the Aviation Department of Beardmores' has but recently resumed work, and consequently no actual accomplished work is to be recorded. This must not, however, be taken to mean that nothing is being done at the Naval Construction Works at Dalmuir, where the Aviation Section is now situated. As recorded elsewhere, Mr. W. S. Shackleton recently took over the post of Chief Designer, and he has since then been busily engaged upon the design of several types of aeroplanes, both military and civilian machines. With regard to the former it is not permissible to speak, owing to Air Ministry restrictions, even were the machines completed. Among the latter, it is possible to state, is a very promising light aeroplane intended for the forthcoming light aeroplane trials at Lympne in September. Mr. Shackleton's A.N.E.C. monoplanes did so well in the 1923 competitions that there is every reason to expect that his 1924 machine will be something rather out of the ordinary as regards efficiency. In the meantime it is only possible to record that there is a rapidly increasing activity in the Beardmore works at Dalmuir, and that before long it will, it is hoped, be possible to give an account of at least one of the machines now passing through the works.

THE BLACKBURN AEROPLANE AND MOTOR CO., LTD.*

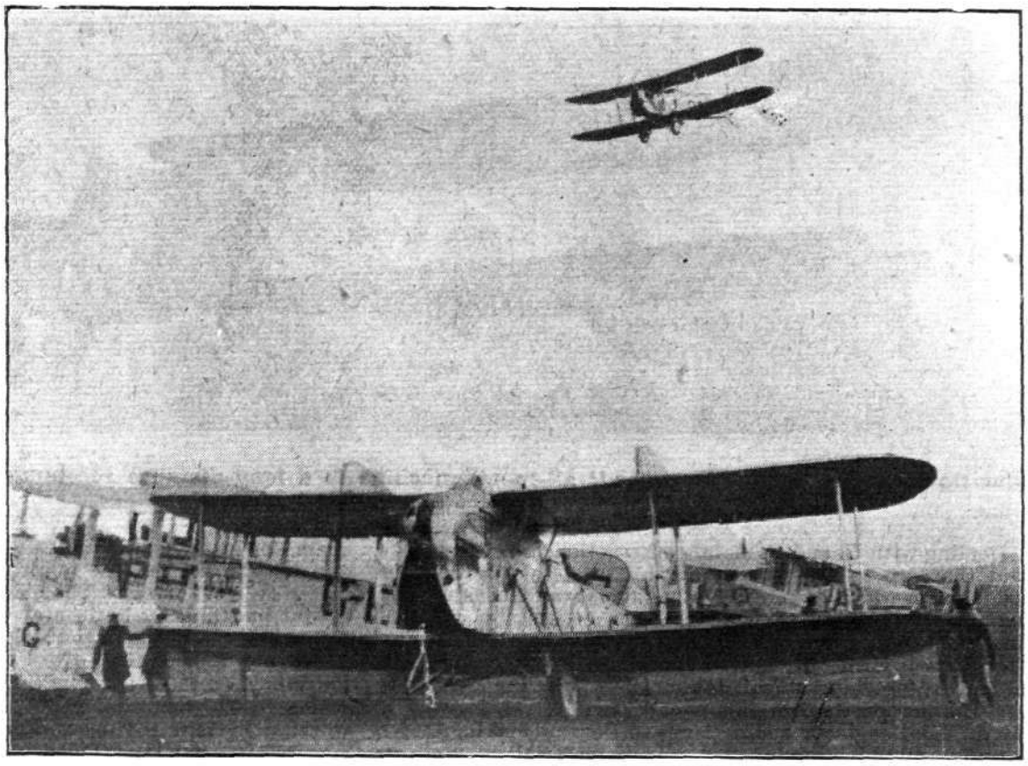
AMONG the British firms exhibiting at Prague is the Blackburn Aeroplane and Motor Co., Ltd., of Leeds. The machine to be exhibited is a Blackburn "Dart" torpedo 'plane with 450 h.p. Napier "Lion" engine. This machine is a single-seater of large carrying capacity, so as to be capable of getting off with a large torpedo and a fairly large quantity of fuel. The machine is a development of the well-known Blackburn



The Blackburn "Swift" torpedo plane single-seater. Can also be supplied as a two-seater Bomber.



Loading a torpedo on the Blackburn "Swift" torpedo 'plane, Napier "Lion" engine.



A Blackburn "Dart" flying over a Blackburn "Blackburn."

"Swift" torpedo 'plane, of which many specimens have been sold to various foreign governments.

The somewhat unusual lines of the Blackburn "Swift" are the result of the special requirements of a machine to be capable of taking off from and alighting on the deck of an aeroplane carrier, requirements to which there is no parallel in aeroplanes operating from a land station. To begin with, the machine must be capable of rapid acceleration in order to gain sufficient speed by the time it has reached the somewhat short run available on an aircraft carrier. For much the same reason it must come to a stop after a very short run. If impracticably light wing loading is to be avoided, this means that these difficult manœuvres must be carried out at or near the stalling speed. Consequently the manœuvrability must be good at the angle of maximum lift, a feature by no means easy of attainment. The pilot's view must be good, as he has not the same margin as in the case of a machine landing on an aerodrome.

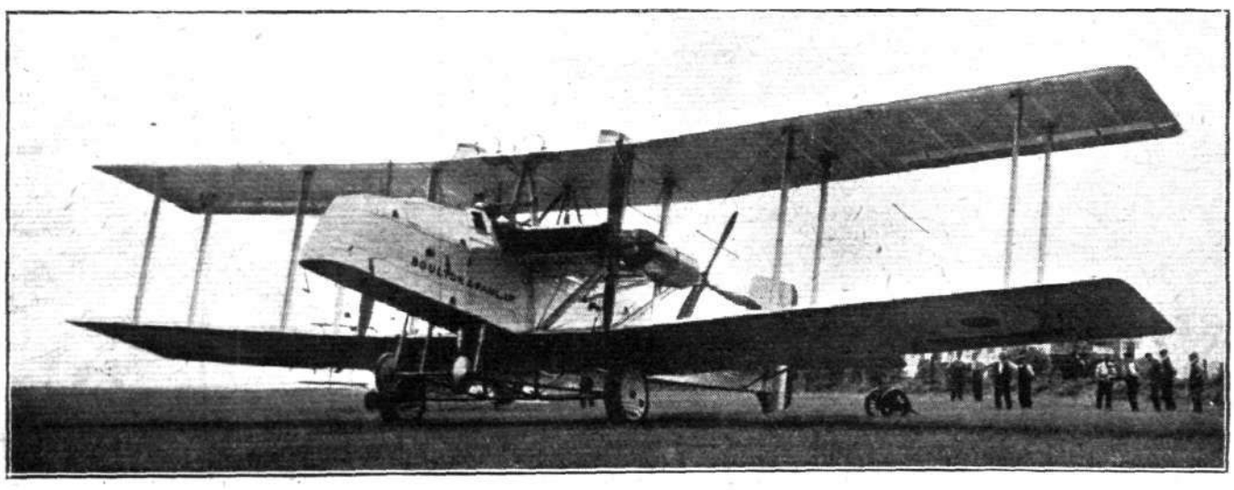
In the "Swift" a high-lift wing section is employed so as to give low landing speed with fairly heavy wing loading. The wings are set at a large angle to the fuselage, so that on alighting the angle of maximum lift is exceeded when the tail skid touches the deck, thus helping to pull the machine up quickly. The pilot's cockpit is well raised, and the forward fairing over the top of the fuselage falls away at a steep angle so as to enable the pilot to look over the top of the engine.

The divided undercarriage allows room for the torpedo to be launched, and apart from the wide wheel track resulting, the chassis is perfectly triangulated, without the use of bent steel tubes. The shock absorbing medium is in the form of rubber blocks working in compression, which have been found to be very satisfactory in use, and to require but infrequent renewal.

The "Swift" is designed to carry an 18-in. (45 cm.) torpedo, and the total load carried, including the pilot, torpedo and gear, instruments, fuel and oil, is 2,876 lb. (1,300 kgs.). The maximum speed of the "Swift" is about 95 knots (175 km/h.), and the rate of climb at sea level is 650 ft./min. (3·30 m/sec.). The ceiling is 15,000 ft. (4,570 m.), and the run required to get off against a 20-knot (37 km/h.) relative wind is about 150 ft. (46 m.)

BOULTON AND PAUL, LTD.

IT is a somewhat unfortunate fact from the point of view of an aviation journal, that in writing about the activities of a firm like Boulton and Paul, Ltd., one is debarred from making any detail reference to the latest machines designed and built by this firm. This is due to the fact that all the machines constructed at the Norwich works have been built to the order of the British Air Ministry, and that, therefore, the more recent ones at any rate are "secret." Some of the older types, however, are now no longer considered to fall into this class, and our remarks must of necessity be confined to such, and to the special form of metal construction of which Boulton and Paul have made a speciality during the last four or five years.

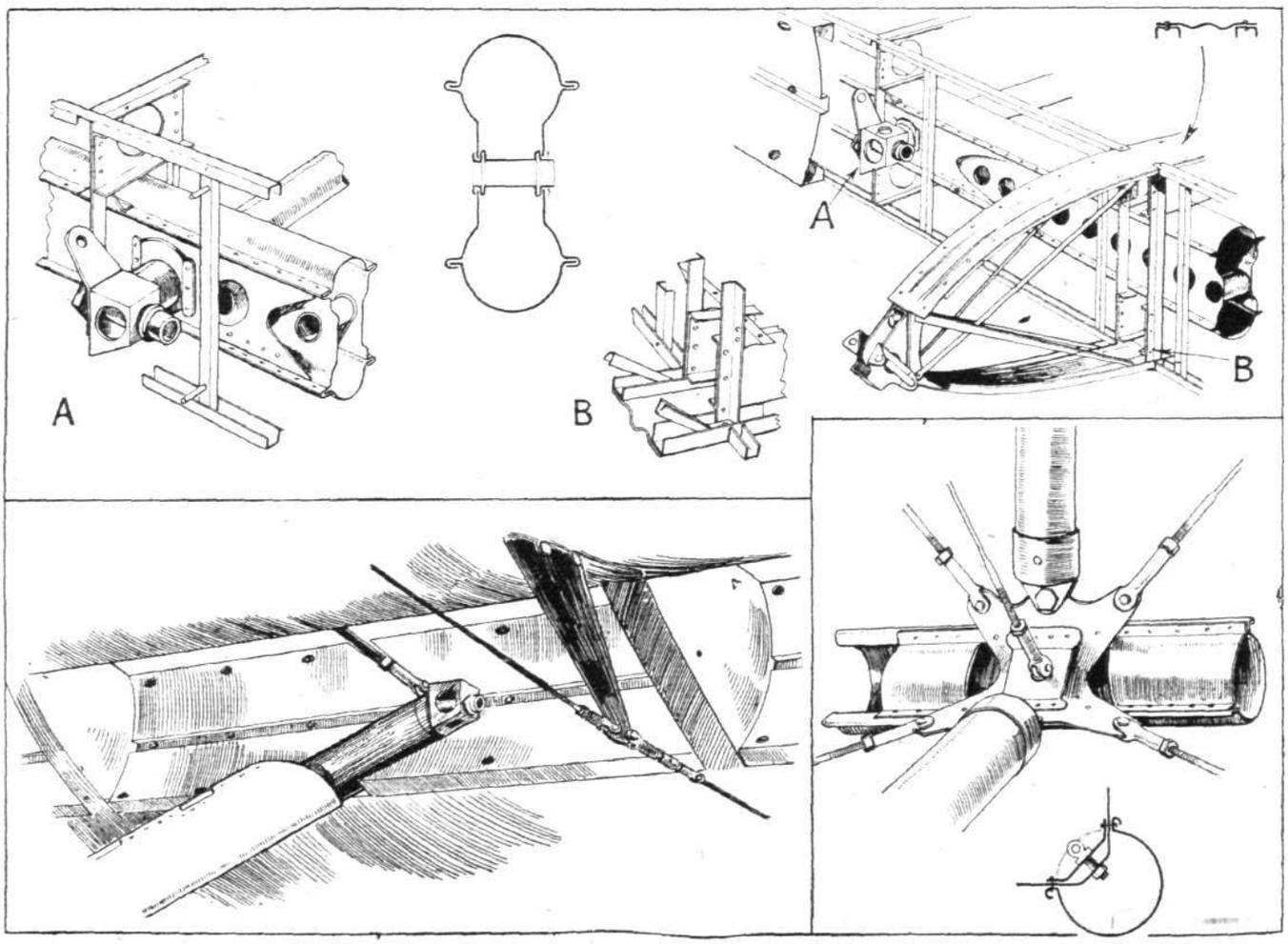


The Boulton and Paul "Bodmin" is an all-metal machine, with two Napier "Lion" engines placed in the fuselage and driving four airscrews *via* gearing.

The Boulton and Paul "Bourges" all-metal machine is a long-distance reconnaissance three-seater. The engines are Napier "Lions."

Dealing with B. and P. metal construction first, it may be said that, up to the present at any rate, this is the only British firm which has entirely abandoned wood construction for metal. In this respect the firm occupies a position somewhat similar to those of Junkers and Dornier in Germany. The actual forms of construction are, however, entirely dissimilar, for whereas Prof. Junkers uses Duralumin entirely, and Dornier partly Duralumin and partly steel, Mr. J. D. North, chief engineer and designer to Boulton and Paul, uses nothing but high-grade steel. This material is used in corrugated sections rolled from flat steel strip, the corrugations having for their object to stiffen the sections against secondary flexure, thus approaching more closely to the ideal form which allows the full strength of the material to be developed.

In a set of sketches accompanying this article a few of the many various forms of rolled sections are shown. The wing spars, for instance, are built up from two side strips and top and bottom flanges, the joining of the strips to the flanges being by steel rivets. The side strips are stiffened against lateral buckling by horizontal tubes, having narrow flanges formed on the inside of the strip, while the outer ends of the tubes are flanged over to lock the strips. The fuselage longerons, on the other hand, are of quite a different section, owing to the fact that they are to be regarded as struts, working in pure tension and/or compression, and not being required to carry lateral loads. Here a tubular section is the most economical, and a method had been developed by Boulton and Paul for manufacturing these approximately tubular members from flat steel strip, in place of the drawn steel tubes more usually employed. One of our sketches gives a perspective view of a typical fuselage joint, where the struts and bracing rods meet the longeron. The section and arrangement will be clear from the sketches.



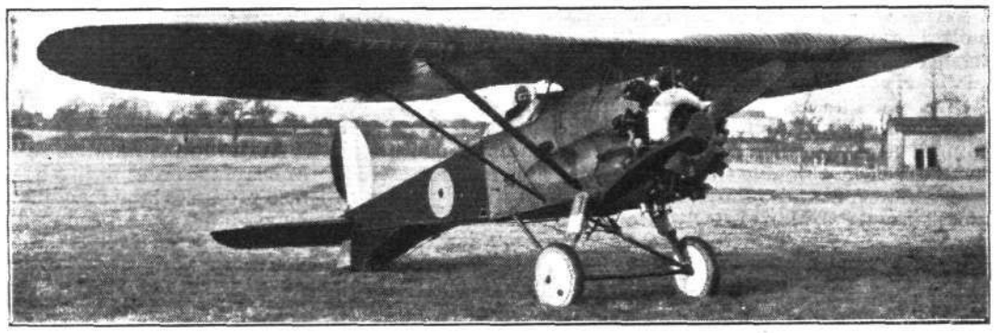
EXAMPLES OF BOULTON AND PAUL METAL CONSTRUCTION: The upper sketches show the construction of wing spars and ribs, while in the lower right-hand corner is seen a typical fuselage fitting. On the left the bracing of the rear spar of the tail plane.

It is perhaps, superfluous to state that many other sections are used locally in the machine, but the foregoing should serve to give an idea of the main features of all-steel construction as developed by Bouton and Paul.

As already mentioned, it is not possible to describe the latest types of Boulton and Paul machines, but a brief reference may be made to the "Bodmin," which, in addition to being of typical Boulton and Paul all-steel construction, is unusual in that the two Napier "Lion" engines are housed in the fuselage, and drive four airscrews placed on the wings. The object of this arrangement was to obtain freedom from total engine failure. The two engines are arranged to drive one pair of propellers each, so that if one engine stops the other continues to drive its own pair of propellers until the damage can be repaired, which in most cases should be possible, owing to the fact that the engines are in the fuselage, where they can be inspected and adjusted by the engineer. It should be mentioned that the whole of the transmission mechanism has been designed and built by D. Napier and Son, whose "Lion" engines form the power-plant of the "Bodmin."

The main characteristics of the Boulton and Paul "Bodmin" are as follows: Length overall, 53 ft. 4½ ins. (16·25 m.); span, 70½ ft. (21·3 m.); wing area, 1,204 sq. ft. (112 m.²); weight, empty, 7,920 lbs. (3,600 kgs.); petrol, 1,660 lbs. (756 kgs.); oil, 320 lbs. (145 kgs.); crew, 540 lbs. (246 kgs.); useful load, 560 lbs. (255 kgs.); total loaded weight, 11,000 lbs. (5,000 kgs.); speed at ground level, 116 m.p.h. (186 km./h.); speed at 15,000 ft. (4,600 m.), 102 m.p.h. (163 km./h.); service ceiling, 16,000 ft. (4,900 m.); climb to 10,000 ft. (3,050 m.) in 16 minutes; climb to 15,000 ft. (4,600 m.) in 35·5 minutes.

The Bristol Bullfinch" is a single-seater fighter monoplane, with 400 h.p. Bristol "Jupiter" engine.



The Bristol fighter, fitted with 400 p.h. Bristol "Jupiter" engine.

THE BRISTOL AEROPLANE CO., LTD.

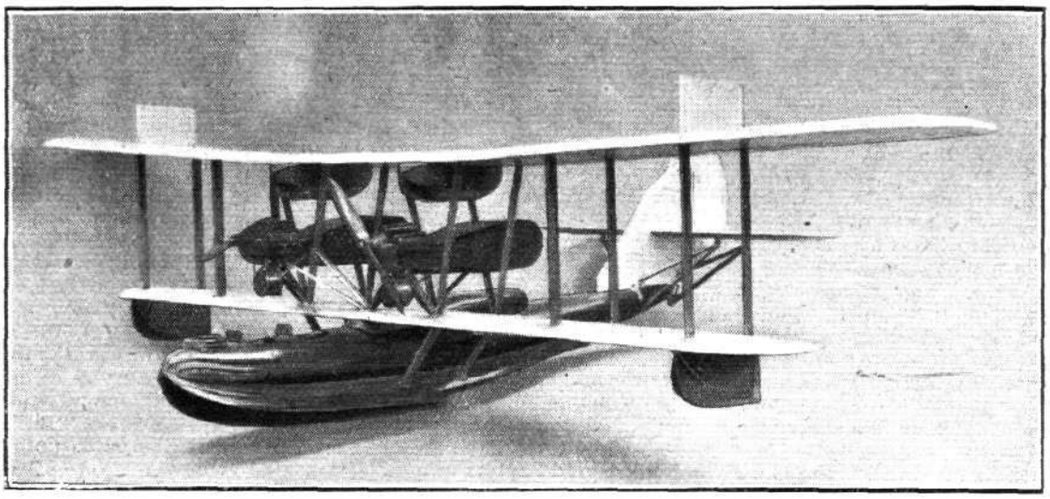
ONE of the most successful two-seater fighters during the War 1914-18 was the famous Bristol fighter, type F.2B, fitted with 260 h.p. Rolls-Royce "Falcon" engine. A modern version of this famous machine is the new Bristol "Jupiter-Fighter," in which the more powerful 400 h.p. Bristol "Jupiter" engine has been substituted for the original engine, and the machine otherwise brought up-to-date. The result is a machine possessing all those qualities of stability, etc., possessed by the original F.2B, but with a vastly better performance. It may be mentioned in passing that recently one of these machines flew from Kiruna to Malmslatt in Sweden, a distance of 1,300 kilometres, in 6½ hours. The start of the flight took place within the Arctic Circle, and no trouble was experienced, the engine "worked like the mechanism of a clock," to quote the Swedish officer who piloted the machine on this flight.

The Bristol "Jupiter-Fighter" is so nearly identical with the well-known F.2B that a detailed description does not appear to be necessary. The main alteration is in the engine mounting and cowling, which have been altered to suit the "Jupiter" engine. Otherwise the machine is almost unchanged. The main dimensions are: Length, o.a., 25 ft. (7·6 m.); wing span, 39 ft. 3 ins. (12 m.); weight, empty, 1,860 lb. (845 kgs.); weight, fully loaded, 3,350 lb. (1,520 kgs.). Speed at ground level, 133 m.p.h. (213 km./h.); speed at 10,000 ft. (3,050 m.), 129 m.p.h. (206 km./h.); speed at 20,000 ft. (6,100 m.), 105 m.p.h. (168 km./h.). Climb to 10,000 ft. (3,050 m.) in 8¼ minutes; to 20,000 ft. (6,100 m.) in 27½ minutes. Service ceiling 22,500 (6,860 m.).

A modern machine produced by the Bristol Aeroplane Company, Ltd., is the "Bullfinch," about which, however, we are not at liberty to publish detailed information. The machine is shown in one of the accompanying photographs, and it will be seen that the parasol monoplane wing is in two sections, thin in the centre so as to improve the pilot's view, and with a considerable maximum thickness at the point of attachment of the wing-bracing struts. The engine is a Bristol "Jupiter" of 400 h.p. The "Bullfinch" is produced as either a single-seater or a two-seater fighter. Other Bristol machines will be found under Civil Aircraft.

THE DE HAVILLAND AIRCRAFT CO., LTD.

OF recent years, Capt. Geoffrey de Havilland has devoted a good deal of attention to commercial aircraft, and has produced some of the most successful of modern civil aeroplanes, which will be referred to under the heading Civil Aircraft. Of military types several have also been produced, but these are not yet released by the Air Ministry for publication, and we are, therefore, prevented from publishing photographs. It may be stated, however, that several types are now in production at the Stag Lane works, and that the firm is, in addition to the production of the usual composite construction aeroplanes, turning its attention to metal construction. More than this it is not possible to say at the moment, and we would refer our readers to the reference to D.H. commercial and light aeroplanes under the sections that follow.



Photograph of the English Electric Company's "Kingston" flying boat, two Napier "Lion" engines.

THE ENGLISH ELECTRIC COMPANY, LTD.

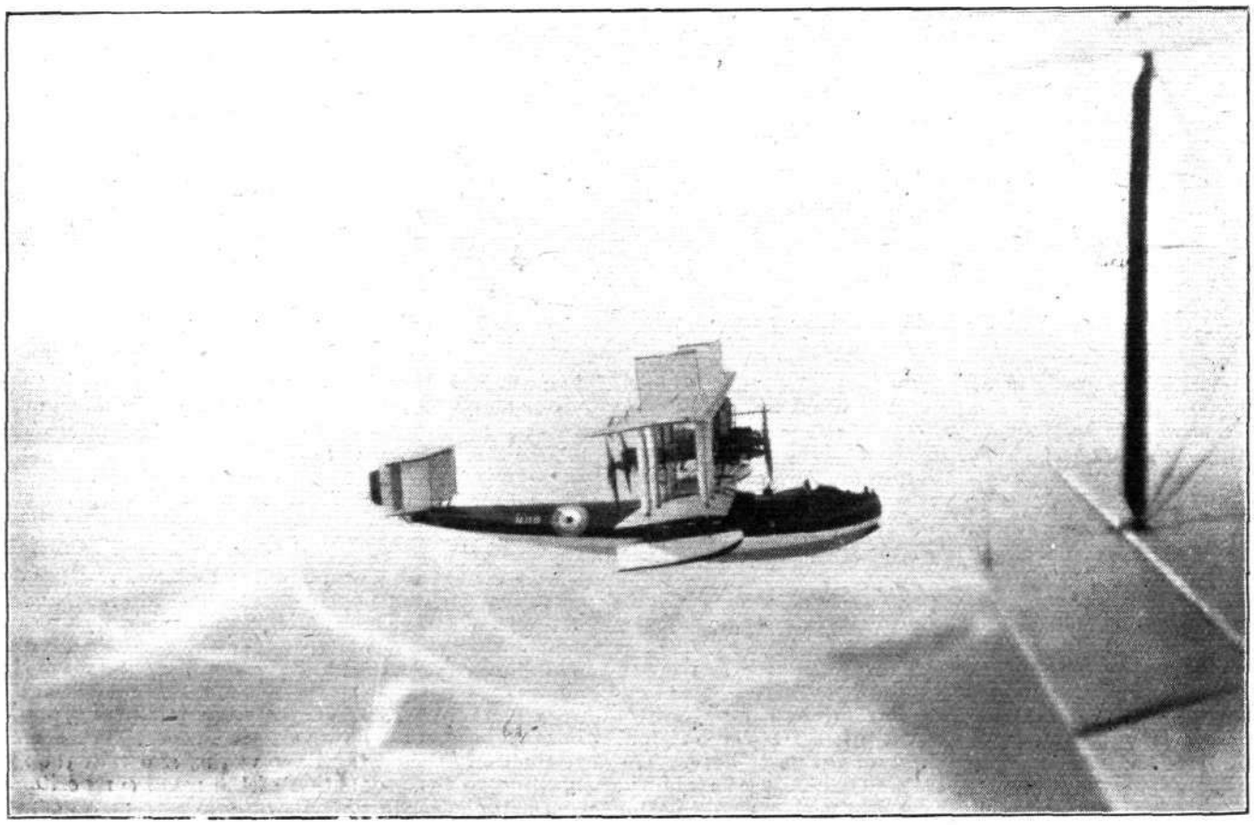
WITH the exception of the little "Wren" light monoplane built last year, the English Electric Co. has confined its attention to the production of seaplanes, or rather flying boats, a type of machine with which the firm's chief designer, Mr. W. O. Manning, has had considerable experience. A very large twin-engined flying boat, the "Phœnix Cork," has been doing extremely well in a series of Naval manœuvres, although naturally we are unable to give details. This machine, which is also known as the "P 5," is built in three slightly different types—the "P 5, Mark I," with Rolls-Royce "Eagle" engines, the Mark II, also with Rolls-Royce "Eagles," and the Mark III, with two Napier "Lions." The main characteristics of the "P 5, Mark I," are: Length o.a., 49 ft. 2 ins. (15 m.); wing span, 85 ft. 6 ins. (26 m.); wing area, 1,307 sq. ft. (121·5 m.²). Weight, empty, 7,350 lb. (3,340 kgs.); useful load, 4,250 lb. (1,930 kgs.); total loaded weight, 11,600 lb. (5,270 kgs.). Speed, 90 knots (166 km./h.). Climb to 10,000 ft. (3,050 m.) in 30 minutes. Service ceiling, 13,000 ft. (4,000 m.).

In addition to the "P 5" the English Electric Co. have just completed another twin-engined flying boat, the "Kingston," a five-seater reconnaissance machine of somewhat unusual design. A photograph of a scale model of the "Kingston" is published herewith. This machine is fitted with two Napier "Lion" engines.

The "Ayr," another English Electric Co. flying boat, incorporates several unusual features. For instance, the lower plane is set at a very large dihedral angle, and serves to give lateral stability on the water, being planked with wood like the hull, so as to be watertight.

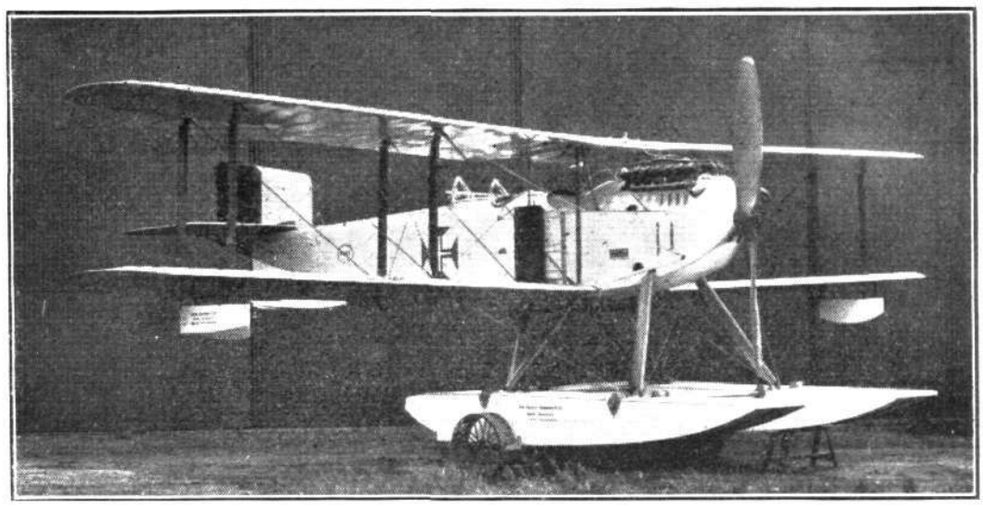
THE FAIREY AVIATION COMPANY, LTD.

ALTHOUGH mainly specialising in the design and construction of seaplanes and flying boats, the Fairey Aviation Company also produces land machines, of which several highly successful types have been produced. Perhaps the best known of all Fairey types is the "III-D," of which large numbers have been delivered both to the British and to many foreign governments. It should be pointed out that the flight around Australia, just accomplished by Wing-Commander Goble and Flying Officer MacIntyre, of the Royal Australian Air Force, was made on a Fairey III-D seaplane, with Rolls-Royce "Eagle IX" engine. Although not by any means one of the latest types, the III-D is still extensively used in actual service, and is everywhere giving satisfaction. It is a two-seater twin-float seaplane, fitted as standard with Rolls-Royce "Eagle" engine. A modified version with Napier "Lion" and oleo land undercarriage has a top speed of 116 m.p.h. (185 km./h.) at 12,000 ft. (3,660 m.), a ceiling with full load of 18,000 ft. (5,500 m.). A feature of the

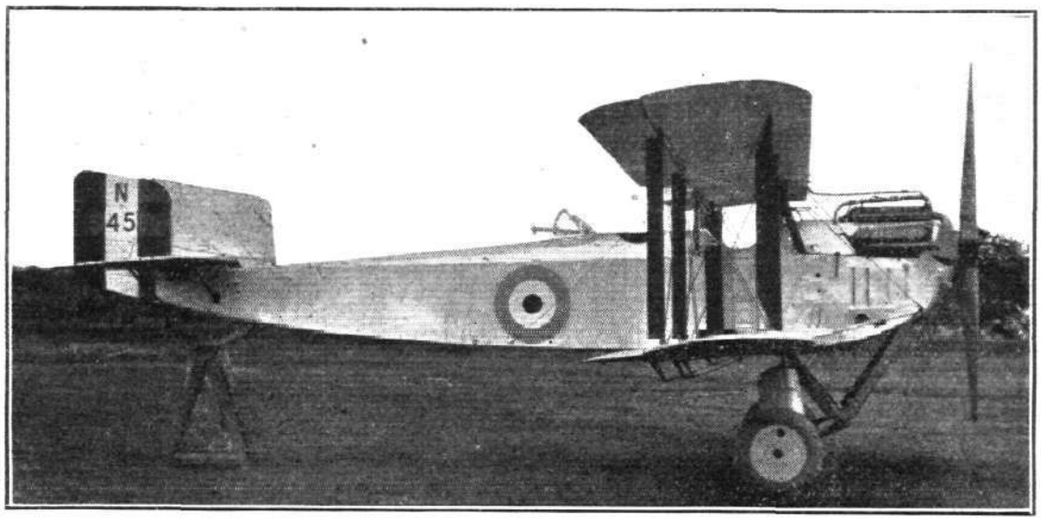


The Fairey "Atalanta" is probably the largest flying boat in the world. The machine is fitted with four Rolls-Royce "Condor" engines.

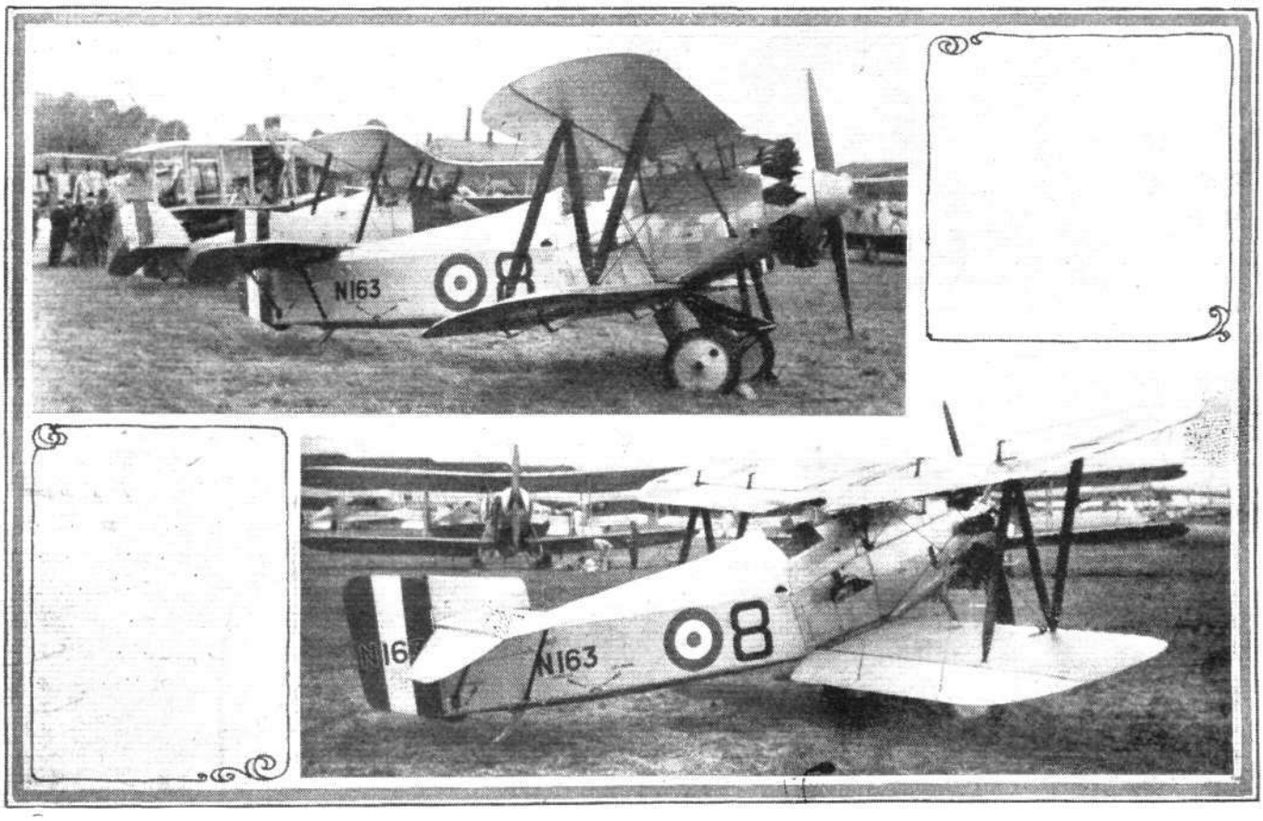
FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS



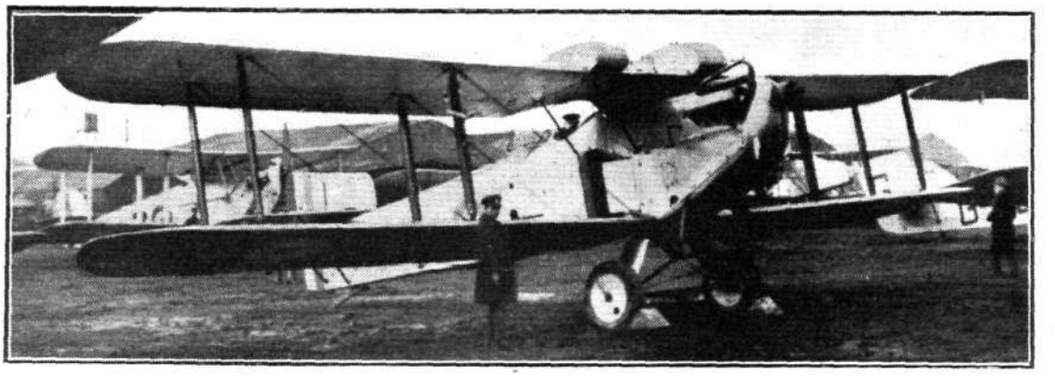
The Fairey "III-D" sea-plane, Rolls-Royce "Eagle" engine.



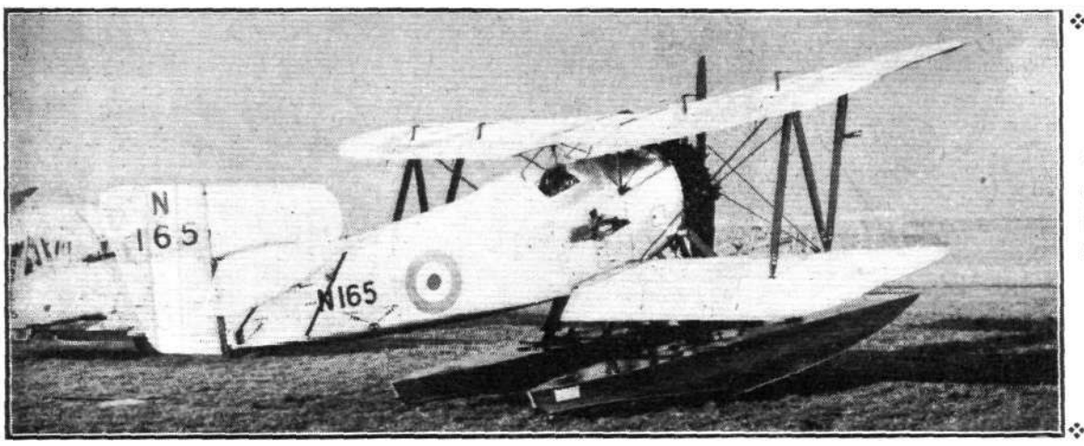
The Fairey "III-D" as a land aeroplane, fitted with Napier "Lion" engine, and oleo under-carriage.



Two views of the Fairey "Flycatcher" single-seater ship fighter, 400 h.p. Bristol "Jupiter" engine.



The Fairey "Fawn" two-seater long reconnaissance machine, Napier "Lion" engine.



Fairey "Flycatcher" amphibian, 350 h.p. Siddeley "Jaguar" engine.

III-D, as indeed of all Fairey machines, is the variable camber gear, which allows even heavily loaded machines to alight slowly. This gear is in the form of hinged trailing edge flaps, which can be raised and lowered by the pilot. When fully down they have the effect of increasing the camber and angle of incidence, and when raised they lie in continuation of the wing section, this position being, of course, used for high speed. The flaps are so arranged that while capable of being operated as a variable camber device, they still retain their differential action as ailerons.

Of other Fairey types mention may be made of the "Fawn," a two-seater long reconnaissance machine with Napier "Lion" engine, Particulars may not be published, but a photograph is given herewith. The same applies to the Fairey "Flycatcher," a single-seater ship fighter, fitted either with 400 h.p. Bristol "Jupiter" or 360 h.p. Armstrong-Siddeley "Jaguar" engine. Having to alight on the deck of a ship, the "Flycatcher" has its wings at a large angle of incidence, and further to increase the angle the tail is cocked up, as shown in the photographs, so that with the camber flaps right down and the tail touching, the wings are at a very large angle. The "Flycatcher" is made in three types: as a land machine, as a twin float seaplane, and as a twin-float amphibian. In the latter form the wheels are partly built into the floats, in the region of the step, and the pilot has no special undercarriage gear to attend to. He cannot, therefore, accidentally alight on the sea with his wheels down, or on an aerodrome with the wheels up. As the wheels are quite inconspicuous, it looks rather strange to see one of these machines alight on an aerodrome.

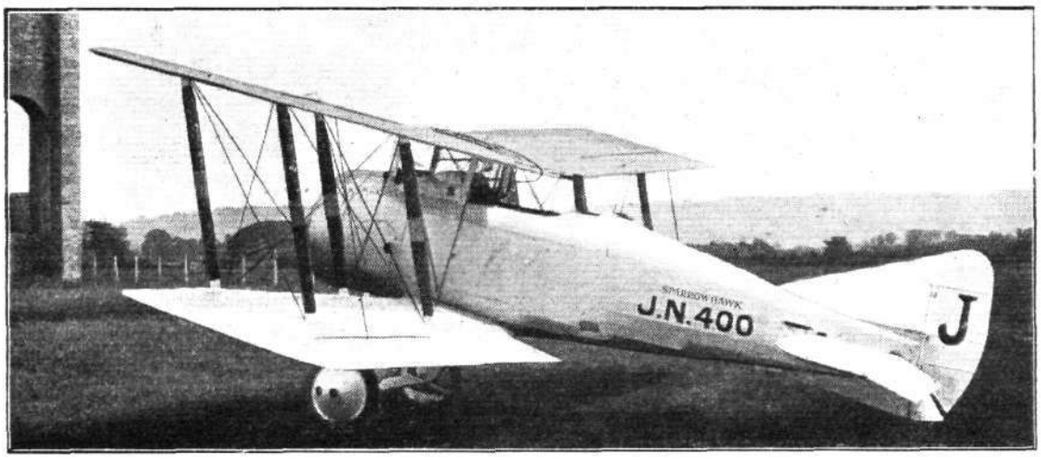
Finally brief mention may be made of the huge four-engined flying boat, the "Atalanta," which is fitted with four Rolls-Royce "Condor" engines of 700 h.p. each. This is probably the largest and most powerful flying boat in the world, and has recently passed its tests successfully. One of our photographs shows this machine in flight. Beyond stating that the "Atalanta" is a six-seater open sea reconnaissance flying boat, no particulars may be published.

THE GLOUCESTERSHIRE AIRCRAFT COMPANY, LTD.

SINCE the formation of this firm in 1920 a number of types have been produced, and it is a well-known fact that Mr. Folland, chief designer to the Gloucestershire Aircraft Company, has for years made a speciality of high-speed aeroplanes. About the pure racing machines we shall speak under the Civil Aircraft section of this article; of military types also a considerable number have been produced. The "Mars II" is a single-seater fighter, developed from the British Nieuport "Nighthawk" designed by Mr. Folland

The Gloucestershire "Grebe" single-seater fighter, with Siddeley "Jaguar" engine.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS



The Gloucestershire "Mars II" is a single-seater fighter with 230 h.p. B.R. II rotary engine.

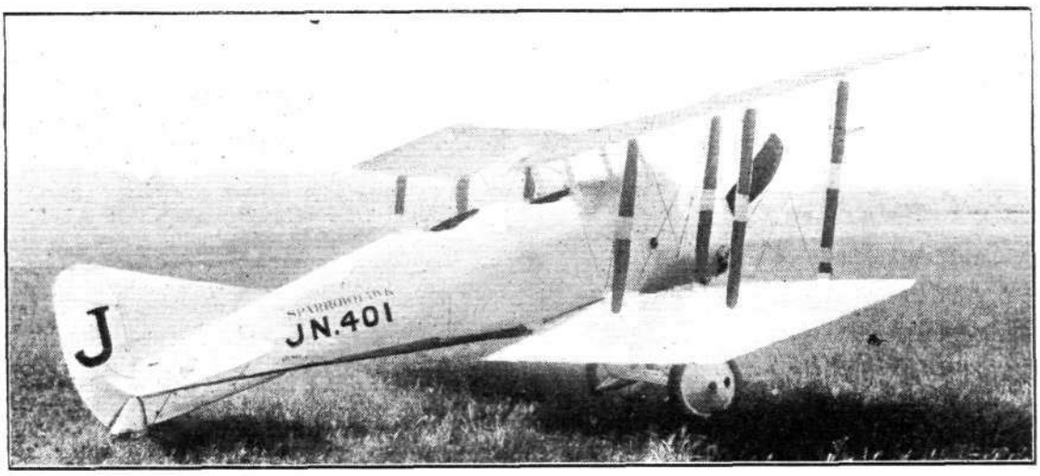
while he was chief engineer and designer to the British Nieuport Company. It is fitted with a 230 h.p. B.R.2 rotary engine, and it may be mentioned that a number of these machines have been delivered to the Japanese Navy, where they have been highly successful both for advanced training and for routine duties. The main specification is as follows: Length o.a., 18 ft. (5·5 m.); wing span, 28 ft. (8·55 m.); wing area, 270 sq. ft. (25 m.²); weight, empty, 1,765 lbs. (800 kgs.); useful load, 400 lbs. (182 kgs.); total loaded weight, 2,165 lbs. (985 kgs,). Speed at ground level, 127 m.p.h. (203 km./h.); speed at 10,000 ft. (3,050 m.), 121 m.p.h. (194 km./h.); speed at 15,000 ft. (4,600 m.), 110 m.p.h. (176 km./h.). Climb to 15,000 ft. (4,600 m.) in 21 minutes. Ceiling, 19,000 ft. (5,800 m.). Range, 300 miles (480 km.).

A modified version, the "Mars X," is designed to alight on and take off from the deck of a ship. The under-carriage is designed to facilitate alighting on the sea, and has a very wide track. Owing to the modifications necessary for the special purpose for which it is designed the "Mars X" has a performance very slightly inferior to that of the "Mars II."

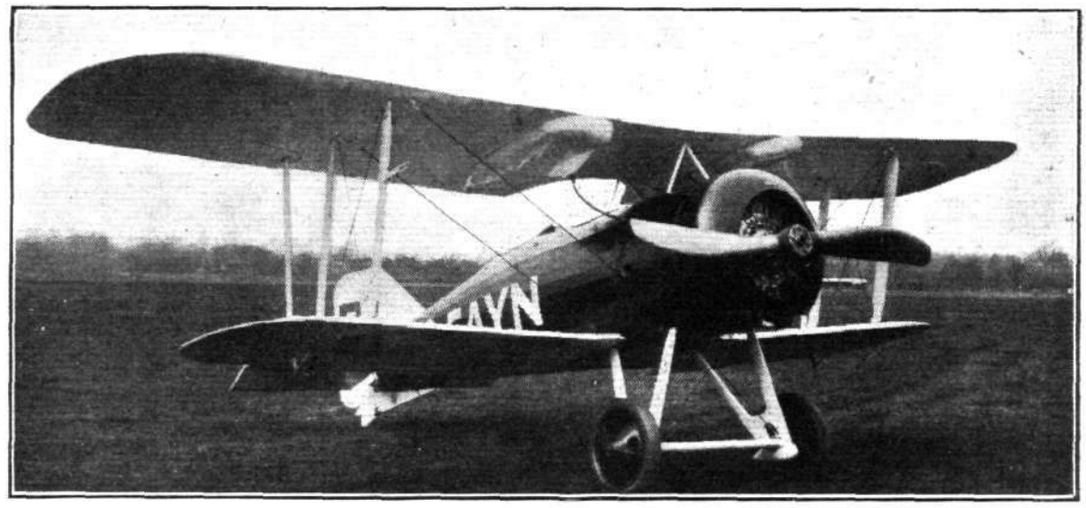
A somewhat similar type to the "Mars II" is the "Mars III," except that it is fitted up as a two-seater training machine with dual control. This machine, shown in a photograph, is exceptionally safe and easy to fly.

The Gloucestershire "Mars VI" is a high-performance single-seater fighter possessing very wide speed range and great manœuvrability. It is supplied either with 400 h.p. Bristol "Jupiter" or 350 h.p. Armstrong-Siddeley "Jaguar" engine. Machines of this type have been supplied to the British and foreign governments, and their flying qualities have been frequently demonstrated in public at the Royal Air Force Pageants during the last three years. The main dimensions of the "Mars VI" are: wing span 28 ft. (8·54 m.); wing area, 270 sq. ft. (25 m.²). With 400 h.p. "Jupiter" engine the performance is as follows: Maximum speed, 150

The Gloucestershire "Mars III" is very similar to the "Mars II," but is a two-seater intended for intermediate training, being fitted with dual control.



The Gloucestershire "Mars VI" is a high-performance single-seater fighter, with very wide speed range and excellent climb. It is variously fitted with 400 h.p. Bristol "Jupiter" or Armstrong-Siddeley 370 h.p. "Jaguar" engine. The photograph shows the "Jupiter" machine.



The Gloucestershire "Grouse" single-seater, with 230 h.p. "B.R.II" rotary engine.

m.p.h. (240 km./h) ; speed at 10,000 ft. (3,050 m.) 143 m.p.h. (229 km./h.). Ceiling, 26,000 ft. (7,900 m). Climb to 20,000 ft. (6,100 m.) in 16½ minutes. With Siddeley "Jaguar" engine the performance is: maximum speed, 150 m.p.h. (240 km./h.); speed at 10,000 ft. (3,050 m.), 142 m.p.h. (227 km./h.); climb to 20,000 ft. in 24½ minutes. Ceiling, 23,000 ft. (7,000 m.).

The Gloucestershire "Grouse" is an advanced training scout, and can also be used as a ship 'plane. It is fitted with 230 h.p. B.R. 2 rotary engine. The overall length is 19 ft. (5·8 m.) and the wing span 27 ft. 6 in. (8·4 m.).

A more powerful type is the "Grebe" single-seater fighter, fitted with 350 h.p. Armstrong-Siddeley "Jaguar" engine. Like the "Grouse, the "Grebe" has its petrol tanks slung beneath the top plane, thus giving direct gravity feed to the carburettor. A feature of both these machines is that the top plane is of much larger area than the bottom, and is of high-lift section while the bottom plane is of fairly thin section. Other Gloucestershire machines will be found described in the following sections of this supplement.

THE H. G. HAWKER ENGINEERING CO., LTD.

OWING to the fact that all their machines are being built to the order of the British Air Ministry, it is not, unfortunately, possible to give details of the Hawker-Sopwith machines. A brief indication of the firm's activities is given in the Historical Section of this article, and it may be stated that this firm is building a light 'plane for the 1924 competitions. Of military types several are now nearing completion at the Kingston works, and we are able to give a photograph of the "Duiker" monoplane which was finished and tested last year. The "Duiker" is a two-seater corps reconnaissance monoplane, and can be fitted with Bristol "Jupiter" or Siddeley "Jaguar" engine. Our photograph shows the machine with the former engine. The monoplane wing is swept back, it will be observed, and is of quite thin section in the centre, while the trailing edge is cut away so as to give a good view in all directions. The wings are braced by one pair of struts on each side, and the under-carriage is of somewhat unusual design, there being no axle connecting the wheels. The track is very wide, almost a necessity in a parasol monoplane in order to reduce the risk of the machine turning over on the ground. A single-seater fighter of very neat design is also being built, and it may be stated that the firm is devoting a good deal of attention to the development of metal construction.

HANDLEY PAGE, LTD.

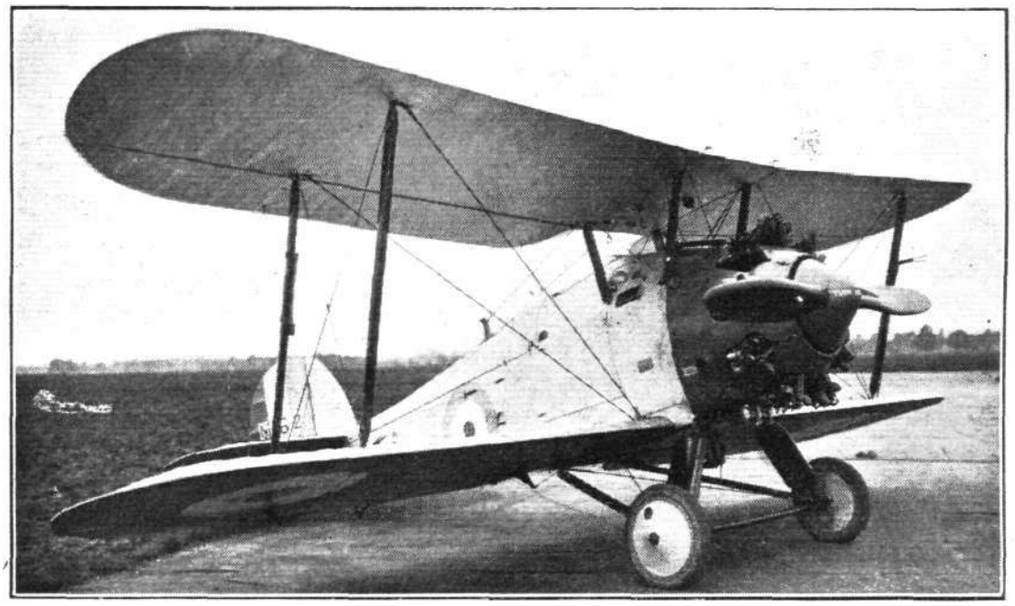
OF military types of Handley Page aircraft it is only possible to refer to the "Hanley," a torpedoplane with Napier "Lion" engine. This machine is chiefly remarkable for the fact that it is fitted with the slotted wings patented by Mr. Handley Page. These slots have the effect of considerably increasing the lift coefficient, although the wing drag is also greatly increased. When, however, the slots are closed, the drag is decreased and with the latest type of slots, the drag is stated to be no greater than in a normal wing. The "Hanley" has an overall length of 33 ft. 4 in. (10·15 m.), a span of 46 ft. (14 m.), and a wing area of 585 sq. ft. (53·3 m.²). The total loaded weight is 6,400 lbs. (2,900 kgs.). It may be mentioned that a small monoplane fitted with slots has attained a speed of 147 m.p.h. (235 km./h.) although the engine with which it was fitted was a B.R. 2 of 230 h.p. only. The landing speed of this machine was less than 50 m.p.h. so that the ratio of maximum to minimum speed was approximately as 3 to 1.

The Hawker-Sopwith "Duiker" Corps Reconnaissance two-seater, Bristol "Jupiter" engine.

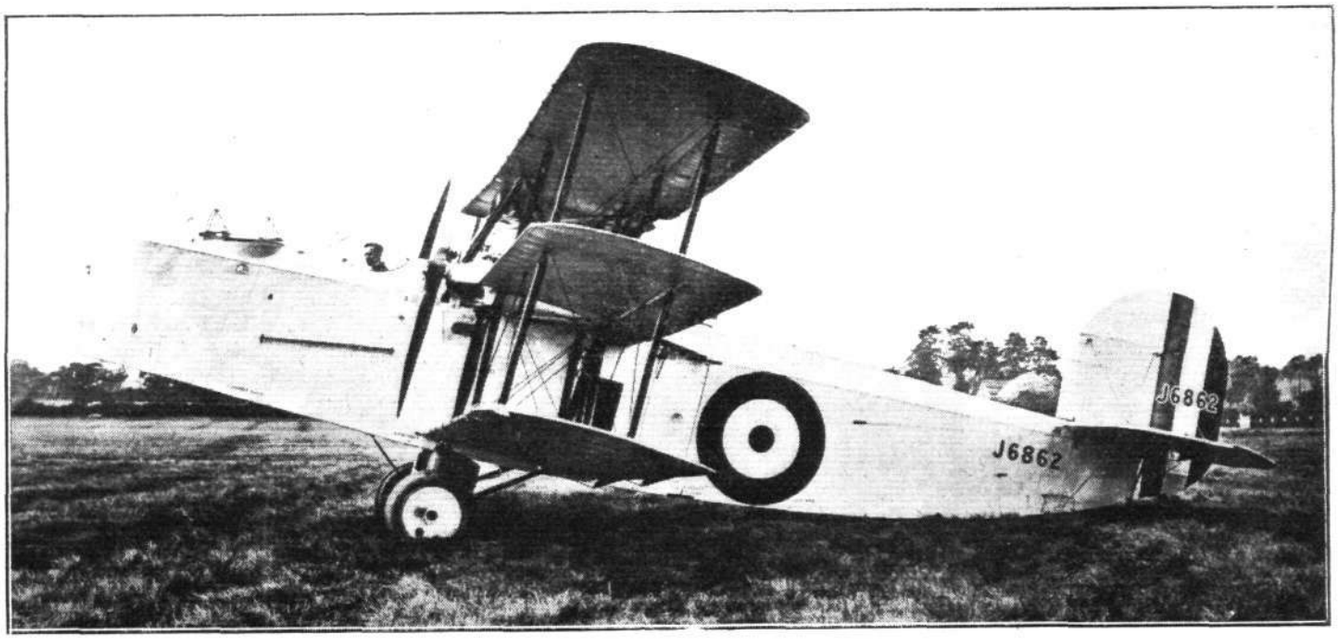
GEORGE PARNALL AND CO.

LIKE so many other British firms at the present moment, George Parnall and Co. of Bristol are mainly building machines to Air Ministry requirements, and to which, therefore, it is not possible to make detailed reference.

The Handley Page "Hanley" torpedo 'plane, with slotted wings, Napier "Lion" engine.



The Parnall "Plover" single-seater ship fighter, Bristol "Jupiter" engine.



The Parnall "Possum" is an experimental machine, with a Napier "Lion" engine placed in the fuselage and driving airscrews on the wings.

The firm is carrying out a good deal of experimental work, both on land machines and on seaplanes. During the war the firm produced the "Panther," a ship's plane with rotary engine. The feature of this machine was that the fuselage was hinged, so that instead of folding the wings the fuselage was "folded" alongside the starboard planes. Another type, the "Puffin" seaplane, was a single-float reconnaissance two-seater, with the rudder and fin placed below the tail plane so as to give the gunner a free field of fire aft.

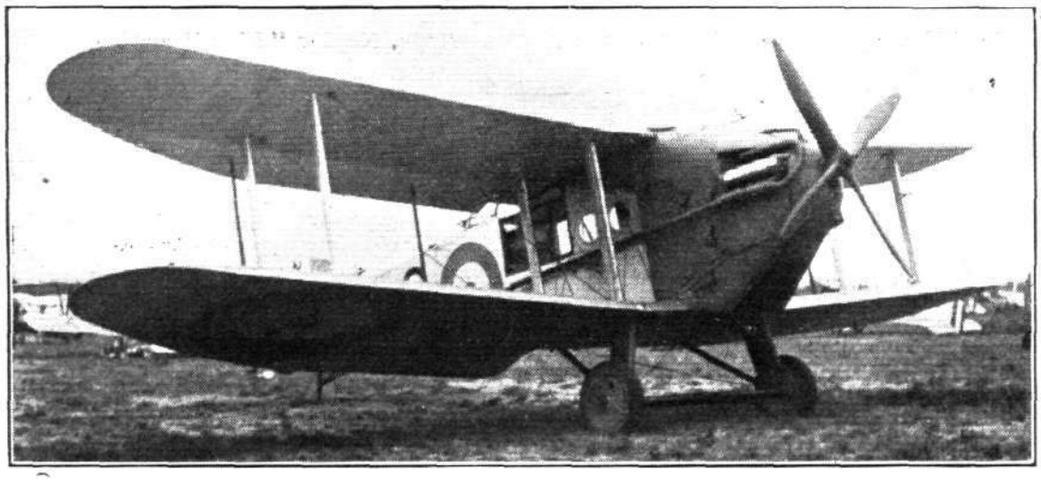
Of recent times Mr. Bolas had designed the "Possum" triplane, in which the Napier "Lion" engine is placed in the fuselage and drives two tractor screws through shafts and bevel gears. A photograph of this machine is given herewith. The "Possum" is designated by the British Air Ministry as a three-seater medium-range postal machine; in other words, it belongs to the same class as the Boulton and Paul "Bodmin." The transmission naturally weighs a good deal, and therefore reduces the useful load somewhat. Against that, however, must be placed the advantage of having the engine centrally situated in the fuselage, where it can be more easily supervised during flight, and minor adjustments made which, if left unattended, might ultimately lead to engine failure.

The Parnall "Plover" is a single-seater ship fighter with Bristol "Jupiter" engine. Details may not be published, but a photograph is given, from which the main features of the machine may be gathered. The Parnall "Pixie" light monoplane attained the greatest speed at Lympne.

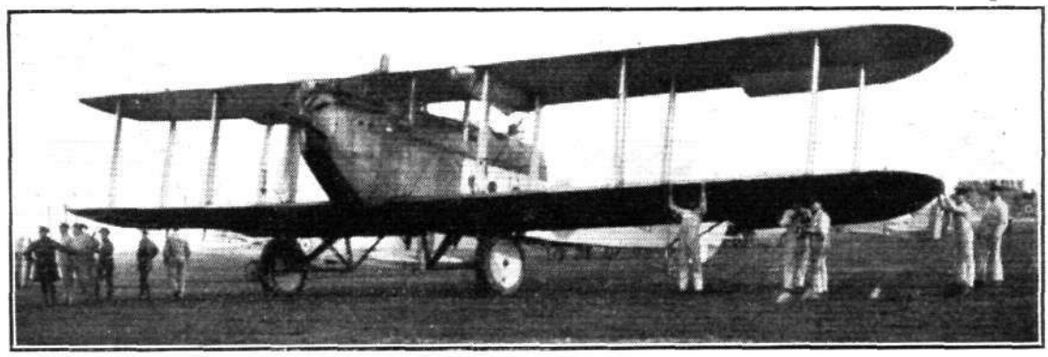
A. V. ROE AND CO., LTD.*

Among the British machines to be exhibited at Prague will be an Avro "Lynx" training machine, a development of the famous Avro "504K," which, since its first appearance in 1913, has, with but few radical alterations, survived until the present day, and is still one of the finest school machines in the world. The original Avro had an 80 h.p. "Gnome" engine, and in more recent versions has been fitted with 110 and 130 h.p. Le Rhone, 100 h.p. Bristol "Lucifer," 180 h.p. Wolseley "Viper," and now with the 175 h.p. Armstrong-Siddeley "Lynx." It may be added that the machine can also be supplied as a twin-float seaplane, so that it will be seen that there is practically no limit to the form in which this extraordinary machine can be obtained.

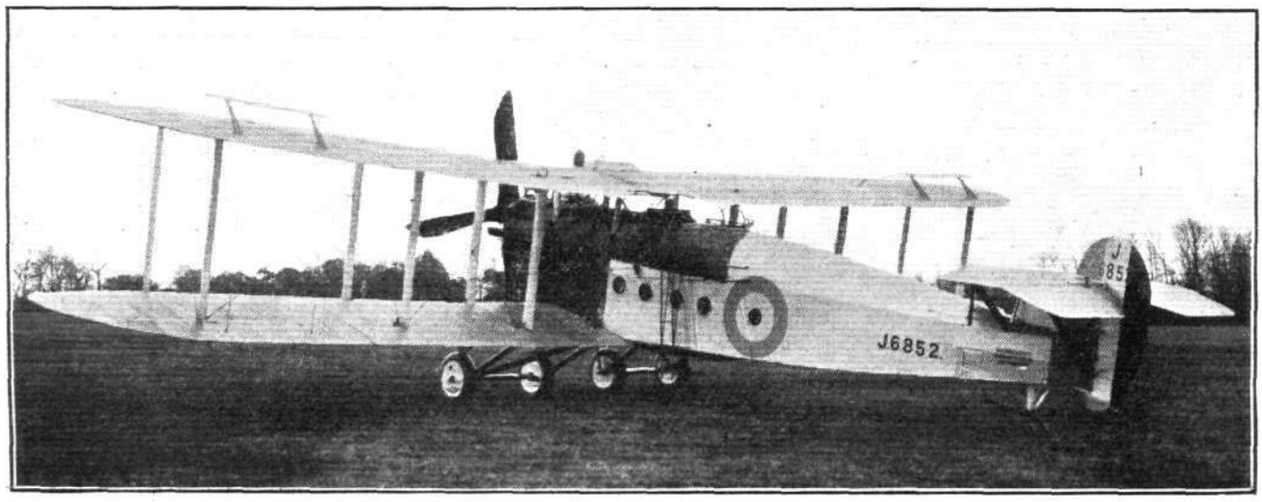
As exhibited at Prague, the "Avro-Lynx" will be a two-seater land machine. The main feature of the machine is, perhaps, the oleo under-carriage which gives an excep-



The Avro "Bison" fleet spotter, with Napier "Lion" engine.



The Avro "Aldershot," with Rolls-Royce "Condor" engine, is a long-distance bomber.



The Avro "Aldershot" long-distance bomber, with 1,000 h.p. Napier "Cub."

tionally long wheel travel rendering it possible to land the machine with a very considerable shock without causing any damage. We have, in fact, seen Mr. Bert Hinkler, the well-known pilot, deliberately stall the machine from a height of 10 metres or so, not only without causing any damage, but without the machine exhibiting any tendency to "bounce." As the machine leaves the ground the wheels can be seen gradually to sink, until the telescopic tubes have reached the outer end of their stroke. The wheels are then ready to receive the shocks of landing, and, as already stated, the long travel absorbs a vast amount of energy without transmitting the shock suddenly to the machine.

The photograph shows the mounting of the Siddeley "Lynx" engine, and also gives a good idea of the arrangement of the oleo under-carriage. Visitors to the Prague Aero. Show should make a point of giving this machine a close inspection, and full particulars will be available.

The petrol tanks are slung from the top plane, well away from the fuselage, and thus greatly minimise the risk of fire, as well as giving direct gravity feed to the engine. The fire risk is further reduced by the placing of a fireproof bulkhead between the engine and the front cockpit.

The centre section of the top plane has been modified so as to give a better view obliquely upwards, and the ailerons are of a special shape, which has been found to lighten and harmonise the lateral control with the elevator and rudder control.

The main dimensions of the "Avro-Lynx" are as follows: Length o.a., 28 ft. 11 ins. (8·83 m.); span, 36 ft. (10·97 m.) wing area, 324 sq. ft. (30·1 m.²). The weight of the machine

THE AVRO "504 N": View showing Siddeley "Lynx" engine, oleo undercarriage, and gravity petrol tanks. This machine will be exhibited at Prague.

The "Avro-Lynx" will be exhibited at Prague.

empty is 1,456 lbs. (660·44 kgs.); useful load, 610 lbs. (276·7 kgs.); total loaded weight, 2,066 lbs. (937·14 kgs.). The performance is: Maximum speed near ground, 95 m.p.h. (152·88 km./h.); at 5,000 ft. (1,524 m.), 93 m.p.h. (149·66 km./h.); at 10,000 ft. (3,048 m.), 89 m.p.h. (143·23 km./h.); at 15,000 ft. (4,572 m.), 79 m.p.h. (127·14 km./h.). The cruising speed at three-quarters full power, and at 10,000 ft. (3,048 m.) is 75 m.p.h. (120·7 km./h.). The landing speed is 45 m.p.h. (72·45 km./h.). The climb is as follows: 914 m. in 4 mins., 1,524 m. in 7 mins., 2,438 m. in 12·5 mins., 3,048 m. in 17·5 mins., 4,572 m. in 38 mins., and 4,876 m. in 45 mins. The service ceiling is 16,000 ft. (4,876 m.).

Of other Avro machines not exhibited at Prague, we give photographs of three types, the Avro "Bison," "Aldershot-Rolls," and "Aldershot-Cub." The "Bison" is a four-seater fleet gunnery spotter with Napier "Lion" engine. This machine is now in the production stage, but has not yet been released by the British Air Ministry for publication.

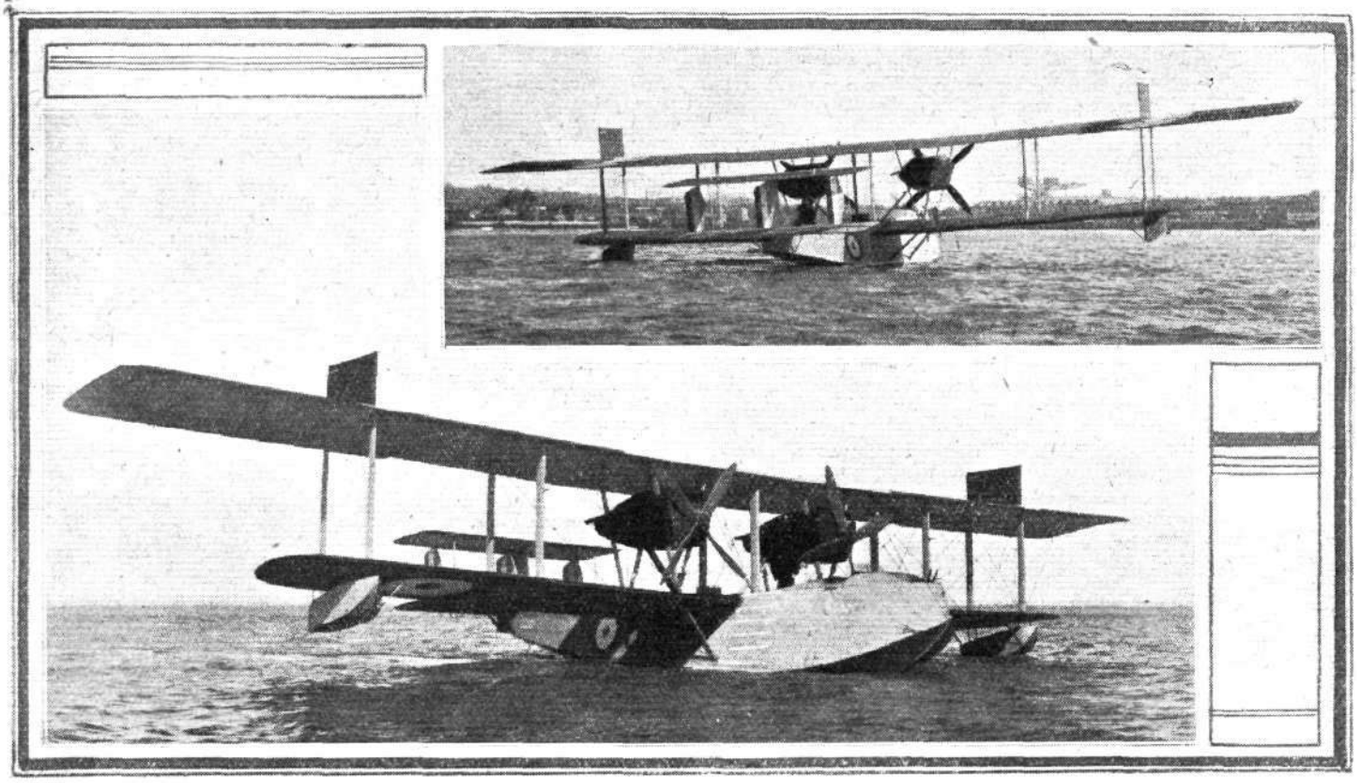
The Avro "Aldershot" is a three-seater long-distance bomber, and is produced in two types, one of which has a 700 h.p. Rolls-Royce "Condor" engine, while the other is fitted with the 1,000 h.p. Napier "Cub" engine. The latter is the most powerful single-engined machine in the world.

S. E. SAUNDERS, LTD.

This famous designer and constructor of racing motor boats has designed and built several experimental seaplanes of very original design. At the moment, however, the aviation department has just been reorganised, and although interesting designs are on the way, there is not at present any new machine of which particulars may be given.

SHORT BROTHERS, LTD.

For the past four years Short Brothers have been steadily working on the construction of all-metal aircraft, even to the wing covering. The first Short all-metal machine built by this firm was the "Silver Streak," exhibited at the Olympia Aero Show in 1920. This machine had tubular steel spars, and highly stressed fittings of steel, but was for the rest built of Vickers duralumin. The wing covering was in the form of very thin duralumin sheet, applied in a special patented manner to the ribs. This machine was purchased by the British Air Ministry, and thorough tests, both flying and sand loading tests, were carried out. So satisfactory were the tests that in 1922 two machines of somewhat more modern type were ordered. These, known as the "Springboks," were fitted with Bristol "Jupiter" engines. In spite of the



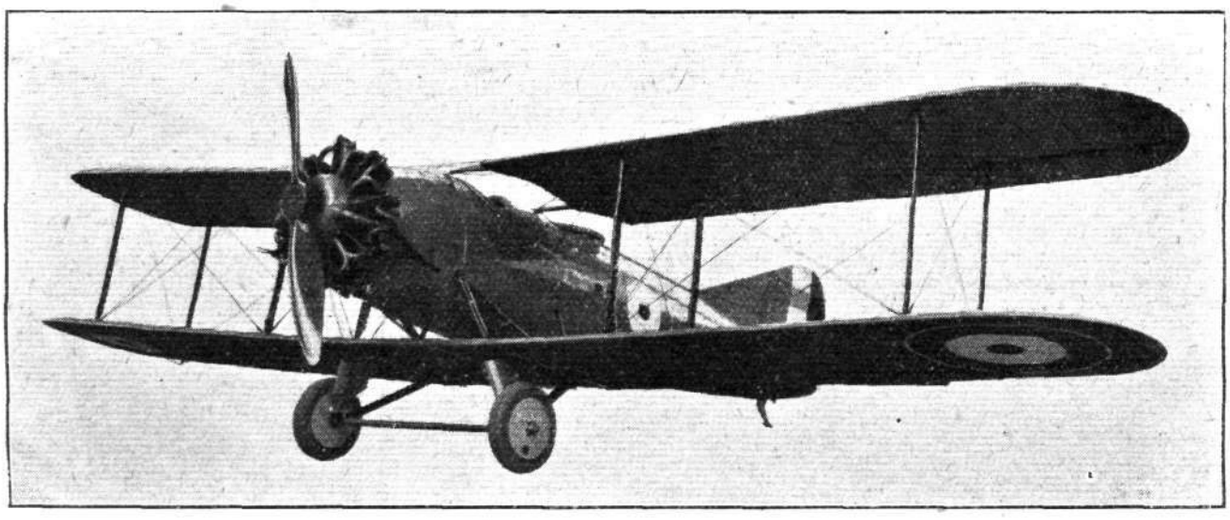
The Vickers-Saunders "Valentia" flying boat, with two Rolls-Royce "Condor" engines.

fact that they were built entirely of metal they were no heavier than similar wood aeroplanes, and a further order has now been received for similar machines, in which certain modifications have been made to increase the military value, but which, as regards the structural principles, are similar to the earlier types. A photograph of a Short "Springbok" is given herewith, while a description of an all-metal light flying boat is given in another section.

It may be mentioned that this firm has now under construction a duralumin hull for an F.5 flying boat. This hull is of entirely novel construction, and is the result of many tests and experiments to ascertain the best methods of obtaining watertightness. It is expected that the weight of this hull will be no more, and possibly less, than that of an ordinary wooden hull of the same volume. The duralumin hull should have the further great advantage that there is no absorption of water when the machine is moored, as is the case with wooden hulls. This hull will be finished towards the end of this summer, and will then be fitted into the standard F.5 wings with Rolls-Royce "Eagle" engines.

THE SUPERMARINE AVIATION WORKS, LTD.

THE only firm in Great Britain to have specialised exclusively in the design and construction of flying boat seaplanes, the Supermarine Aviation Works, of Southampton, have produced a long series of machines of very varying types, from the small fast single-seater Schneider Cup racer to large twin-engined seagoing machines. Unfortunately, these have all been designed for Government purposes, and it is not possible to do other here than briefly mention the special features of some of them, relying upon the accompanying photographs to give a general idea of the lines of each design. The Supermarine "Channel" type may be said to have been the forerunner of all later Supermarine machines. Fitted at first with a Beardmore engine, and later with a Siddeley "Puma," this machine carried three passengers, and was thus a very economical machine to operate. It had a circular hull, of the "Linton-Hope" type, in which circular frames and straight longitudinal stringers forms the framework to which the boat-built planking is attached. This form of construction has been retained in all Supermarine machines, and

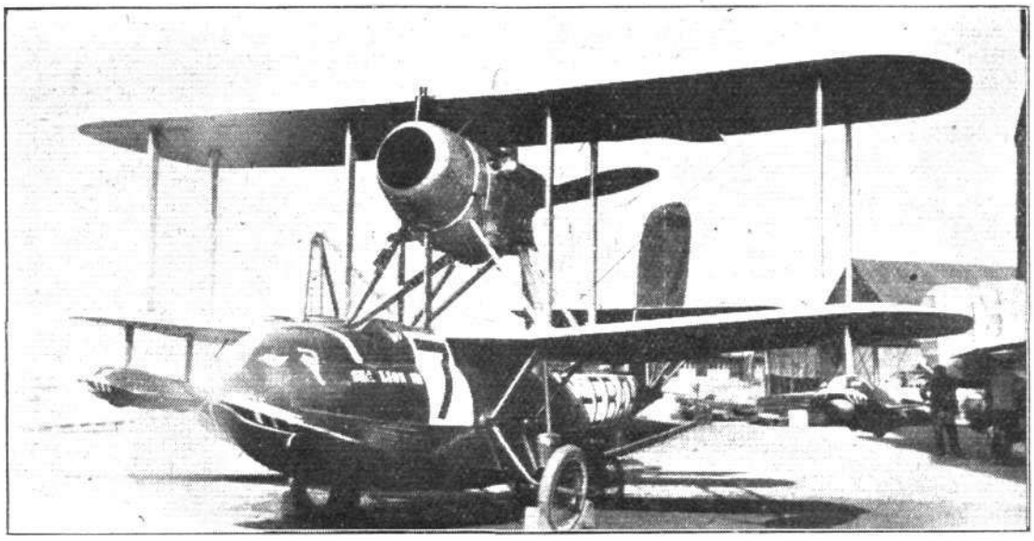


The Short "Springbok" is an all-metal two-seater fighter with 400 h.p. Bristol "Jupiter" engine.

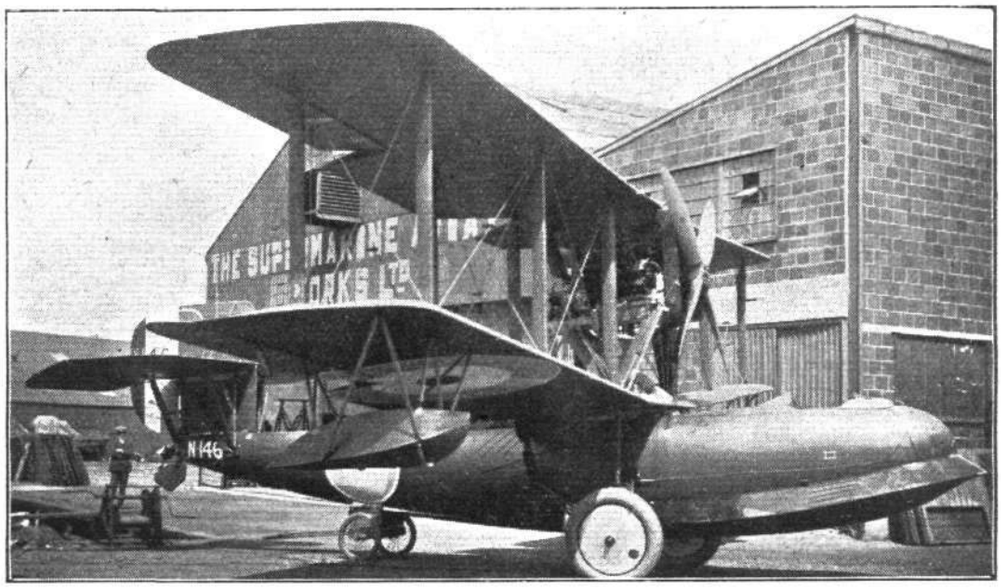
FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

the keynote to the aims and objects of the Supermarine designers is found in the "motto" of the firm: "A boat that will fly, rather than an aeroplane that will float."

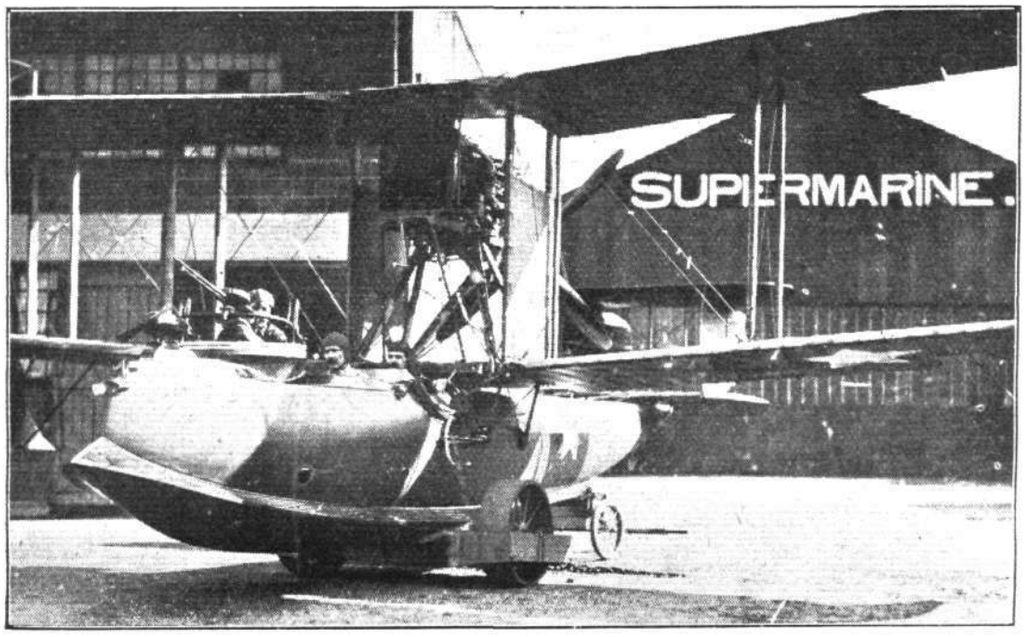
The Supermarine "Seagull" is a fleet-spotting, deck-landing amphibian flying boat with Napier "Lion" engine. An unusual feature of this machine is that it is designed as a tractor, *i.e.*, the airscrew is placed in front of the wings instead of the more usual "pusher" arrangement, in which the



The Supermarine "Sea Lion" is a fighting scout amphibian, with Napier "Lion" engine. It is similar to the Schneider Cup racer of 1923.



The Supermarine "Seagull" is a deck-landing amphibian fleet spotter with Napier "Lion" engine. An unusual feature is the tractor airscrew.



The Supermarine naval training school machine is a three-seater.

The Supermarine "Swan" twin-engined amphibian flying boat is probably the first machine of its type in the world. The engines are Rolls-Royce "Eagle IX"

propeller is behind the wings. The "Seagull" is a three-seater, with the pilot placed in the extreme nose, where his view is exceptionally unrestricted. A land undercarriage is fitted which is drawn up under the wings when the machine is on the water. Thus the "Seagull" can operate from a carrier, but should it be impossible for it to return it can quite safely alight on the sea until such time as the mother ship can pick it up. For stowing on board ship the wings are made to fold back, when the machine occupies but a small space, a matter of importance on an aircraft carrier.

One of our illustrations shows a naval training and school type of flying boat, which has been used extensively by various navies of the world for training in seamanship, navigation, bomb dropping, gunnery, and wireless telegraphy. Similar types, all descendants of the "Channel" type, have been used for survey work. The engine, as in the older type, is a Siddeley "Puma."

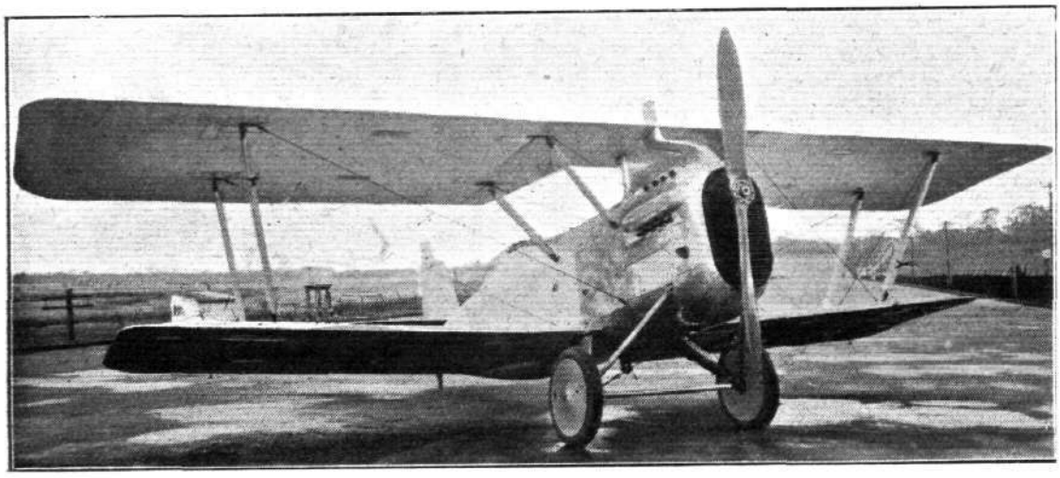
Recently a new large type of amphibian twin-engined flying boat has been completed at the Southampton works, and has been put through its flying tests over Southampton Water. This machine, the Supermarine "Swan," is the first amphibian twin-engined flying boat ever built, and it is hoped to develop it ultimately for passenger work, as well as for specialised duties of various kind. The general design of the "Swan" is shown in one of our photographs.

The Supermarine "Sea Lion" fighting scout amphibian is identical with the racer entered for the Schneider Cup seaplane race at Cowes last year, and is, therefore, a machine with a very high performance. In the race, when it was not fitted with the land undercarriage gear, the "Sea Lion," which is fitted with a Napier "Lion" engine, impressed the spectators not only with its speed but also with its climb, which appeared simply phenomenal. As a service machine, with amphibian gear, gun, ammunition, &c., the extra weight will, of course, pull down the performance somewhat, but for all that the machine would be a formidable antagonist, and it is doubtful if there is another single-seater flying boat in the world which could match it, more especially when it is remembered that seaworthiness and strength has not been sacrificed for mere performance.

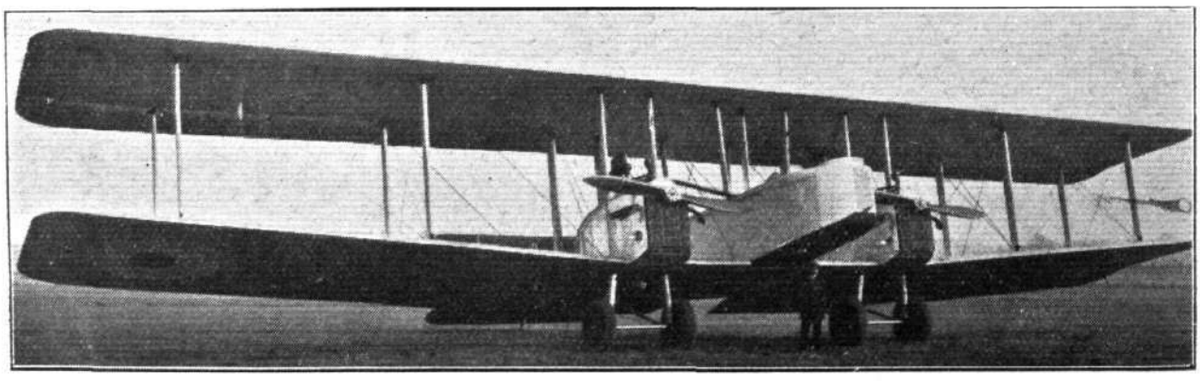
In the section dealing with Civil Aircraft will be found a description of the "Sea Eagle" commercial flying boat used on the Southampton-Guernsey route.

VICKERS, LTD.

THE old armament firm of Vickers, Ltd., has produced a long series of different types of aircraft, including single and twin-engined commercial machines, troop carriers, single-seater and two-seater fighters, twin-engined bombers, amphibian seaplanes, and large twin-engined flying boats.

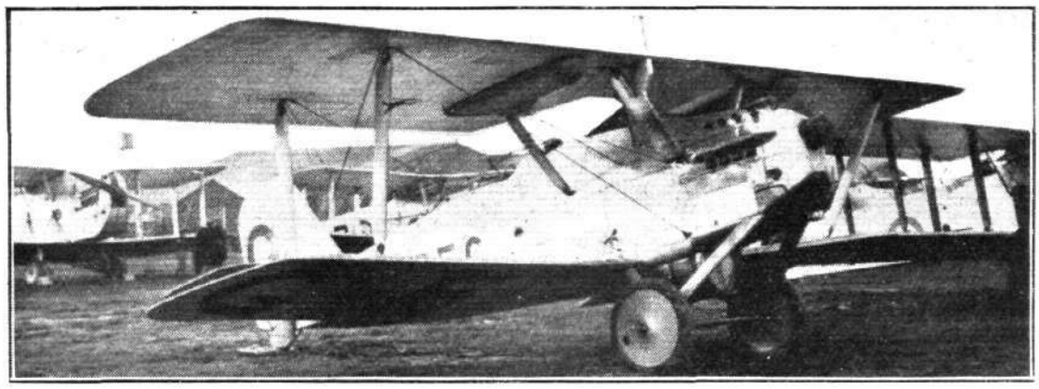


The Vickers "Valparaiso" military two-seater, with Napier "Lion" engine.

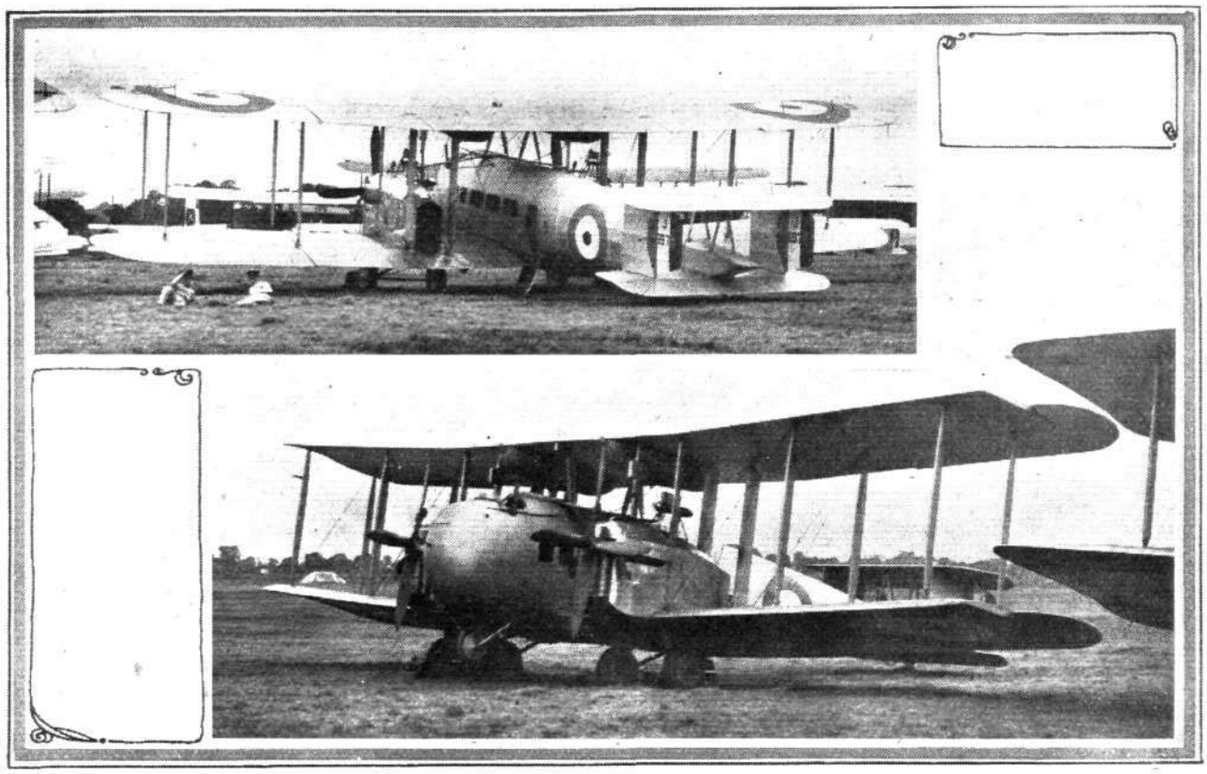


The Vickers "Virginia" long-distance bomber, two Napier "Lion" engines.

FLIGHT
& AIRCRAFT ENGINEER AIRSHIPS



The Vickers "Vixen," Napier "Lion" engine.

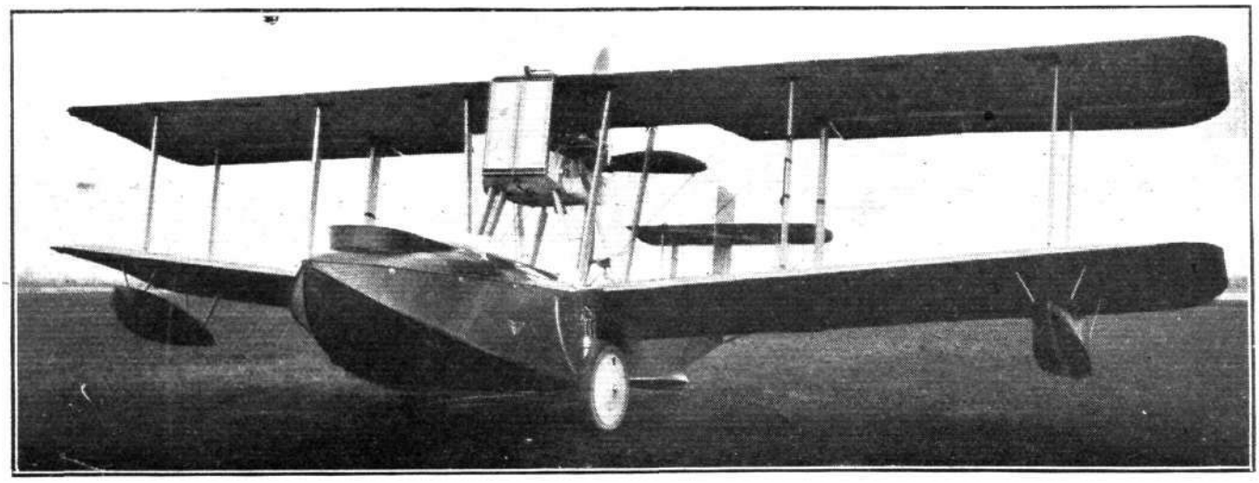


Vickers "Victoria" and "Vernon" troop carriers. Both are fitted with Napier "Lion" engines.

Out of this long list it is not for obvious reasons possible to do more than mention briefly a few, the commercial machines being dealt with under the Civil Aircraft heading. The military types are mostly built for the British Air Ministry, and the same restrictions applying to other military machines obtain.

Commencing with the troop carriers, the "Vernon" and "Victoria" are a development of the Vickers "Vimy-Commercial." They are twin-engined biplanes, both fitted with Napier "Lion" engines. The "Vernon" is the smaller of the two, with accommodation for two pilots and

(*Continued on page* 326.)



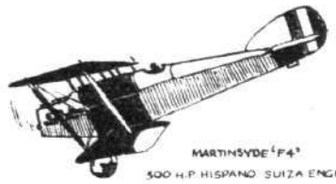
The Vickers "Viking IV" amphibian, Napier "Lion" engine.

DE HAVILLAND '37
270 H.P. ROLLS ROYCE 'FALCON' ENGINE

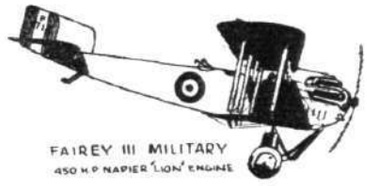
BRISTOL TAXIPLANE
100 H.P. BRISTOL 'LUCIFER' ENGINE

GLOUCESTERSHIRE "MARS VI"
550 H.P. SIDDELEY 'JAGUAR' ENGINE

MARS I (BAMEL)
450 H.P. NAPIER 'LION' ENG

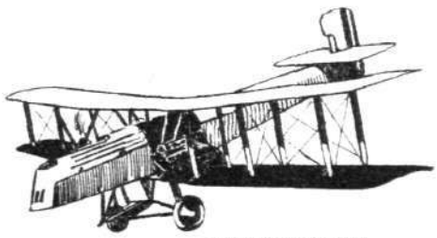


MARTINSYDE 'F4'
500 H.P. HISPANO SUIZA ENGINE



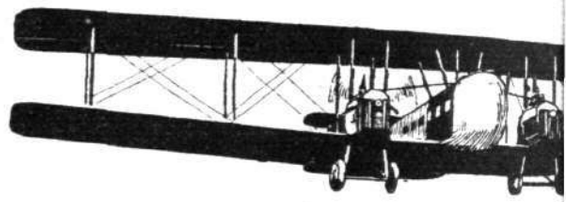
FAIREY III MILITARY
450 H.P. NAPIER 'LION' ENGINE

BLACKBURN FLEET
450 H.P. NAPIER 'LION' E



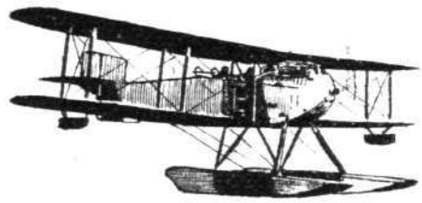
TWIN 'BOLTON' BOMBER
2-450 H.P. NAPIER 'LION' ENGINES

AVRO 504 N
180 HP. SIDDELEY 'LYNX' ENGINE

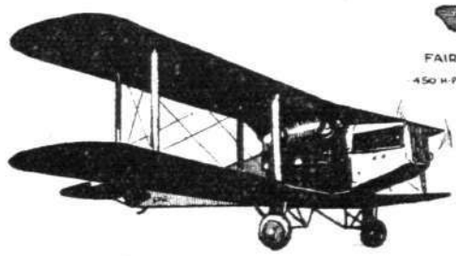


VICKERS VICTORIA
2-450 H.P. NAPIER 'LION' ENGINES

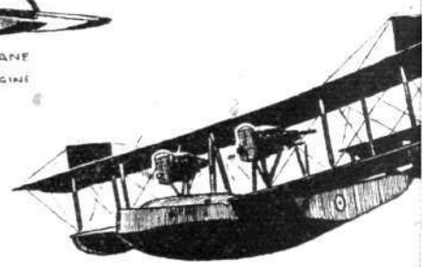
SUPERMARINE 'SEAL'
450 H.P. NAPIER 'LION' ENGINE



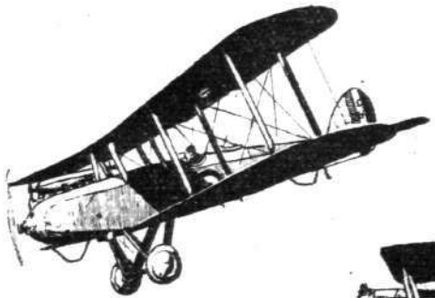
FAIREY IIID SEAPLANE
450 H.P. NAPIER 'LION' ENGINE



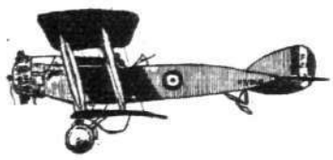
DE HAVILLAND "27"
650 H.P. ROLLS-ROYCE 'CONDOR' ENGINE



SHORT "CROMARTY"
2-650 H.P. ROLLS-ROYCE 'CONDOR' ENG

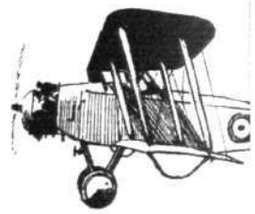


DE HAVILLAND "9"
230 H.P. SIDDELEY 'PUMA' ENGINE



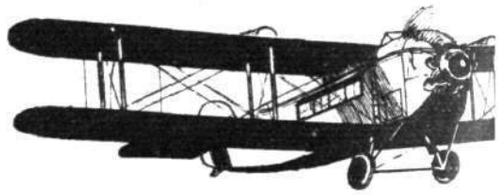
BRISTOL "FIGHTER"
400 H.P. BRISTOL 'JUPITER' ENGINE

DE HAVILLAND '9A'
400 H.P. LIBERTY ENGINE



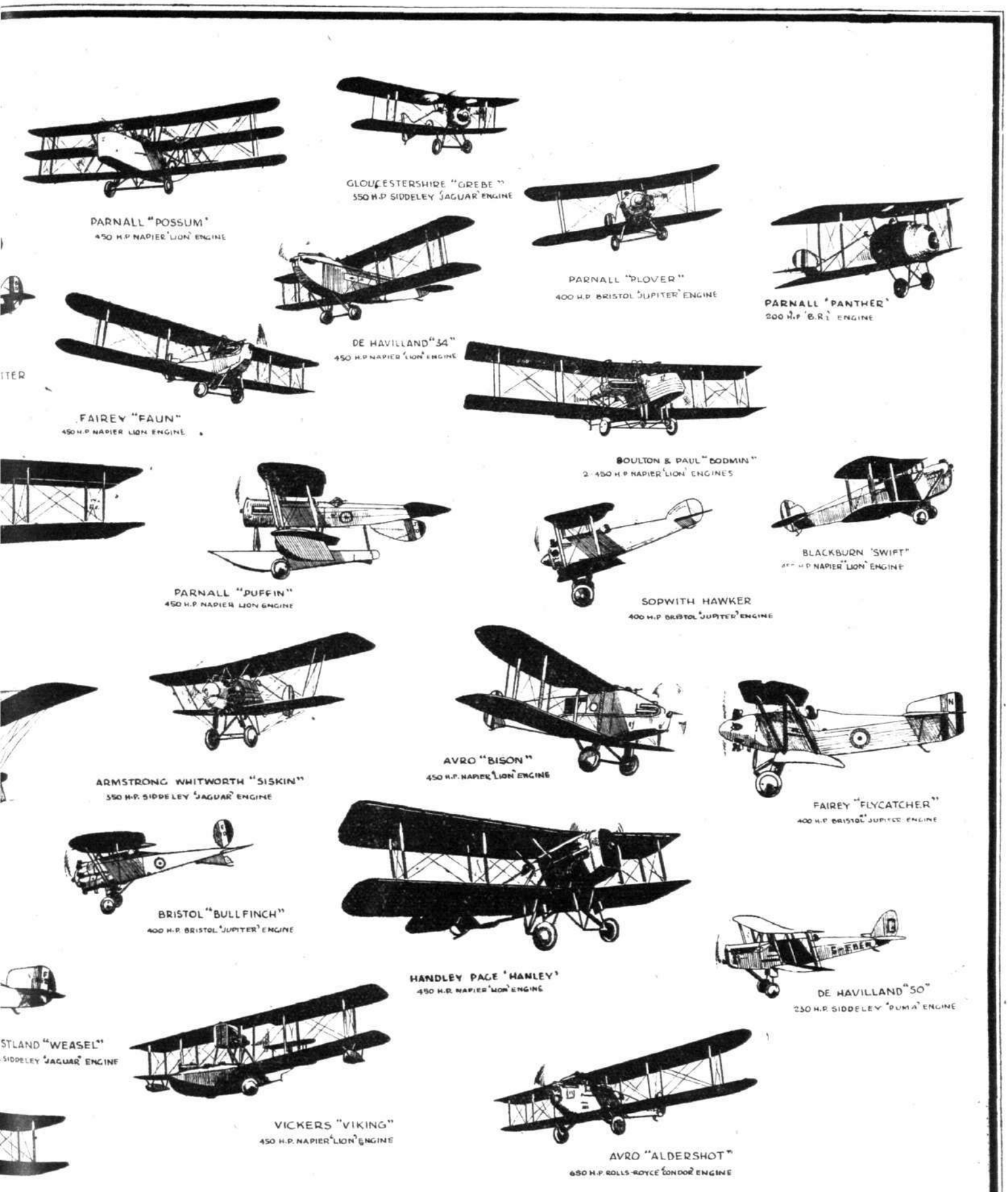
BRISTOL MONOPLANE
100 H.P. BRISTOL 'LUCIFER' ENGINE

HANDLEY PAGE 'W8b'
2-360 H.P. ROLLS-ROYCE 'CONDOR' ENGINES

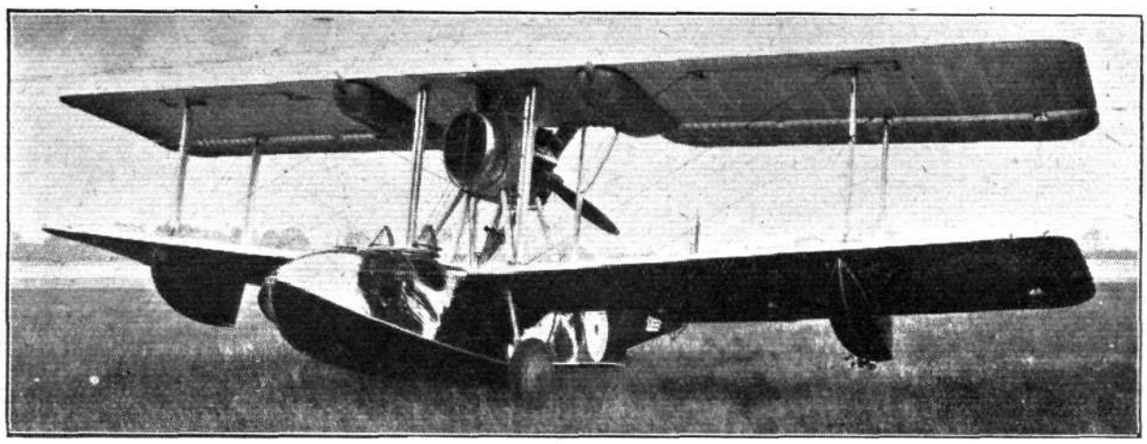


BRISTOL "10 SEATER"
400 H.P. BRISTOL 'JUPITER' ENGINE

REPRESENTATIVE TYPES



OF BRITISH AIRCRAFT



The Vickers "Vanellus" amphibian is similar to, and descended from, the Vickers "Vikings." The engine is a Napier "Lion."

(*Continued from page* 323.)

10 men. The "Victoria," of similar general appearance, is a considerably larger machine, as the following figures of dimensions will show :—

	"Vernon."	"Victoria."
Length o.a.	43 ft. 8 in. (13·4 m.)	51 ft. 7 in. (15·7 m.)
Span	68 ft. 0 in. (20·7 m.)	86 ft. 6 ins. (26·4 m.)
Wing area	1,330 sq. ft. (123·5 m.²)	2,166 sq. ft. (200 m.²)
Weight empty	7,890 lbs. (3,590 kgs.)	10,155 lbs. (4,620 kgs.)
Total loaded weight ..	12,500 lbs. (5,689 kgs.)	18,100 lbs. (8,220 kgs.)
Maximum speed ..	120 m.p.h. 192 km./h.)	102 m.p.h. (163 km./h.)
Minimum speed ..	50 m.p.h. (80 km./h.)	48 m.p.h. (77 km./h.)
Climb to 5,000 ft. (1,525 m.)	11·4 mins.	21 mins.

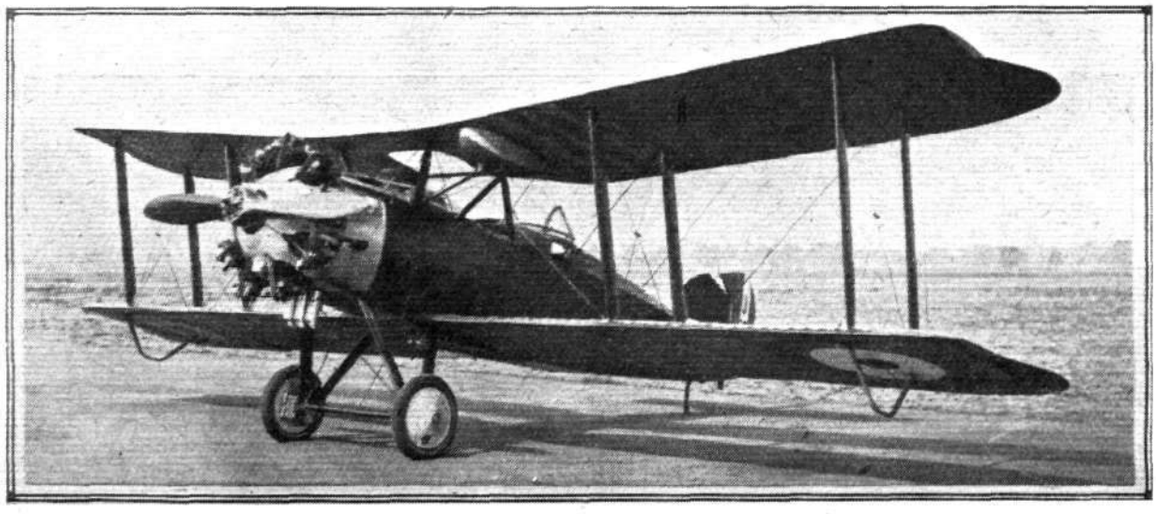
The Vickers "Virginia I" is, to outward appearance, an enlarged edition of the famous "Vickers Vimy" on which the late Sir John Alcock crossed the Atlantic, the late Sir Ross Smith flew from London to Australia, and on which many other famous flights were made. The "Virginia" is a long-distance night bomber fitted with two Napier "Lion" engines. Its main characteristics are : Length o.a., 50 ft. 7 ins. (15·4 m.) ; wing span, 86 ft. 6 in. (26·4 m.) ; wing area, 2,166 sq. ft. (200 m.²). Weight empty, 9,277 lbs. (4,220 kgs.) ; total loaded weight, 16,660 lbs. (7,570 kgs.). Maximum speed, 100 m.p.h. (160 km./h.). Minimum speed, 46 m.p.h. (73 km./h.). Climb to 5,000 ft. (1,525 m.) in 17¼ mins. Duration : 13 hrs. at 85 m.p.h. (136 km./h.).

The Vickers "Vixen," a two-seater reconnaissance fighter, was an experimental machine produced during 1923, and its modernised version has now been put into production under the name "Valparaiso." Photographs of both types are given so that a comparison may be made.

The "Valparaiso" can be obtained either with Napier "Lion" engine or with Rolls-Royce "Eagle IX." The performance differs according to the engine, but the dimensions are the same in both cases, namely : Length o.a., 29 ft. (8·84 m.) ; wing span, 40 ft. (12·2 m.) ; wing area, 526 sq. ft. (49 m.²). The empty weight of the two machines differs very slightly, being 3,128 lbs. (1,420 kgs.) with the "Lion" and 3,158 (1,430 kg.) with the "Eagle IX." The total loaded weight is the same for the two, namely, 4,720 lbs. (2,150 kgs.). The landing speed is the same in both cases, *i.e.*, 50 m.p.h. (80 km./h.), but the top speeds differ greatly, being 140 m.p.h. (224 km./h.) at 10,000 ft. (3,050 m.) for the "Lion" and 121 m.p.h. (194 km./h.) at the same altitude for the Rolls. In the climb, too, there is a marked difference, the "Lion"-engined machine taking but 10·2 mins. to 10,000 ft. (3,050 m.), while the Rolls-engined types take 16 minutes to reach the same height.

A development of the "Vixen" differing somewhat from the "Valparaiso" is being put into production for the British Air Ministry, and will be known as the "Venture." Details of this machine are not available for publication.

The Vickers "Viking IV" is a single-engined "pusher" amphibian flying boat with Napier "Lion" or Rolls-Royce "Eagle" engine. It is a very useful craft for coast or forest patrol, and in the latter capacity has recently been adopted by the Canadian Air Force, some of the machines being constructed in Canada by Canadian-Vickers. As in the case of several other Vickers machines, the "Viking IV" can be supplied either with "Lion" or "Eagle" engines, the performance varying somewhat according to the type fitted. The main dimensions are : Length o.a., 34 ft. 2 ins. (10·4 m.) ; wing span, 50 ft. (15·25 m.) ; wing area, 635 sq. ft. (59 m.²). The empty weight of both machines is approximately the same, *i.e.*, 4,040 lbs. (1,835 kgs.), but as the "Lion" type carries a crew of four while the "Eagle" is designed for but three, the total loaded weight differs, being 5,790 lbs. (2,630 kgs.) for the "Lion" and 5,600 lbs. (2,540 kgs.) for the Rolls. The maximum speeds are 115 m.p.h.



The Westland "Weasel" two-seater fighter, Bristol "Jupiter" engine.

(184 km./h.) and 105 m.p.h. (168 km./h.) respectively, and the climb to 5,000 ft. (1,525 m.) occupies 7·2 mins. and 12·2 mins. respectively. The minimum speed is about 48 m.p.h. (77 km./h.). A modern version of the "Viking" is the "Vanellus," a photograph of which is given.

Other Vickers machines will be described under the next section.

THE WESTLAND AIRCRAFT WORKS

THE work at present being carried out at the Westland Aircraft Works at Yeovil is of such a confidential nature that it is not possible to refer to it here. It may be said, however, that the firm is doing pioneer experimental work, having designed and built recently machines of very unorthodox design. Metal construction is not being lost sight of, and it is hoped that before long it will be possible to publish illustrations of some modern Westland machines. In the meantime we are publishing a photograph of one type of Westland military aeroplane, the "Weasel," which is a two-seater fighter fitted either with Bristol "Jupiter" or Siddeley "Jaguar" engine. The neat lines of this machine can be gathered from the illustration.

BRITISH CIVIL AIRCRAFT

Including Commercial, Racing, and School Machines

[In the following notes and illustrations will be found representative examples of British machines used for commercial flying, sport, or school work. It is not claimed that every machine built of recent years is included, but such types as have been in constant use, or are still being employed regularly, are briefly dealt with.—ED.].

THE BRISTOL AEROPLANE CO., LTD.

SEVERAL types of civil aeroplanes have been produced by the Bristol Aeroplane Company since the War. The Bristol 10-seater has already been illustrated and described in FLIGHT on several occasions, and it is not, therefore, proposed to give a description of it here, beyond recalling that it is a tractor biplane with 400 h.p. Bristol "Jupiter" engine, and a luxurious cabin for the passengers. The machine has been used on the London-Paris service. Its main characteristics are: Length o.a., 40 ft. 6 ins. (12·35 m.); wing span, 57 ft. 6 ins. (17·5 m.); wing area, 704 sq. ft. (65·5 m.²). Weight, empty, 4,000 lbs. (1,820 kgs.). Total loaded weight, 6,755 lbs. (3,070 kgs.). Speed at 5,000 ft. (1,525 m.), 110 m.p.h. (176 km./h.). Cruising speed, 95 m.p.h. (152 km./h.). Climb to 5,000 ft. (1,525 m.) in 13 minutes.

A development of this machine is the Bristol Ambulance, which is very similar to the 10-seater in general appearance, but which has been specially designed to enable stretcher cases to be carried on board, while accommodation is also provided for doctor and nurse.

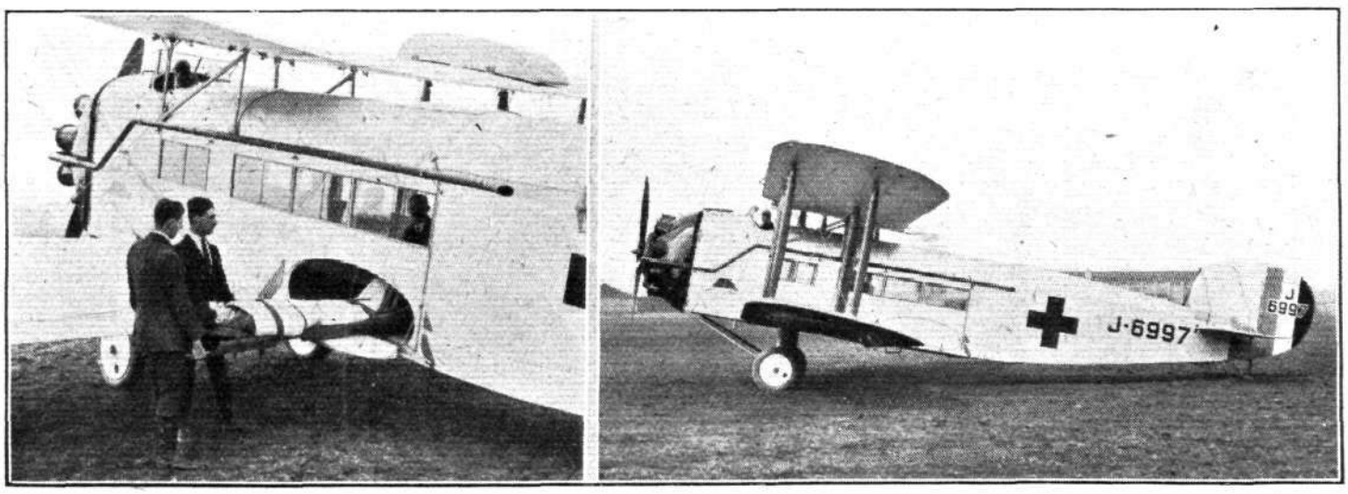
One of the accompanying photographs shows a row of Bristol school machines, a type being used by the Bristol Aeroplane Company for the training of Royal Air Force Reserve Officers. These machines have now been in use for a year, and not a single accident has happened. This speaks well for the safety of the Bristol school machine, which can, of course, also be used as a private touring machine or for "taxi" work. The British school machine is fitted with a three-cylinder Bristol "Lucifer" engine of 100 h.p., so that it is economical to operate and of low first cost. The main characteristics of the machine are: Length o.a., 24 ft. 4 ins. (7·4 m.); wing span, 31 ft. 1 in. (9·46 m.); weight, empty, 1,240 lbs. (564 kgs.); weight, fully loaded, 1,740 lbs. (790 kgs.). Speed at ground level, 89 m.p.h. (142 km./h.); speed at 10,000 ft. (3,050 m.), 82 m.p.h. (131 km./h.).

A row of "Bristol" school machines, fitted with three-cylinder Bristol "Lucifer" engines.

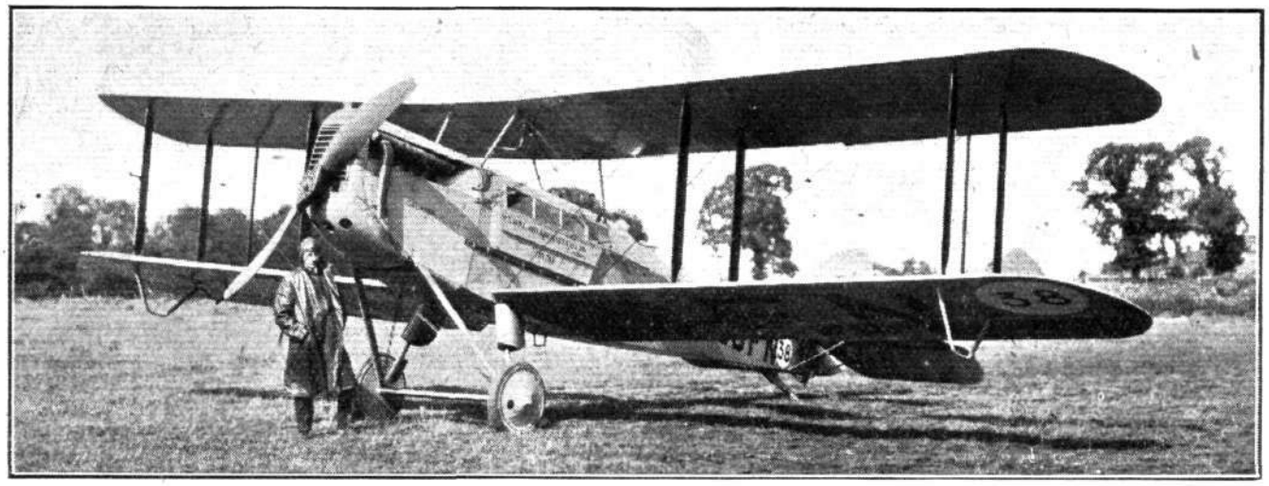
THE DE HAVILLAND AIRCRAFT CO., LTD.

FOR several years now Capt. Geoffrey de Havilland has been making a special study of the requirements of commercial aviation, and his firm have produced some of the finest commercial aeroplanes in the world. Space does not allow of referring to all the types produced, but two of the better known may be briefly described.

The D.H. 34 has been extensively used on the British



The Bristol ambulance is similar to the Bristol ten-seater passenger machine, but is fitted up for carrying stretcher cases. The engine is a Bristol "Jupiter."



The "D.H.50" carries four passengers and pilot, although fitted with a Siddeley "Puma" engine of 240 h.p. only.

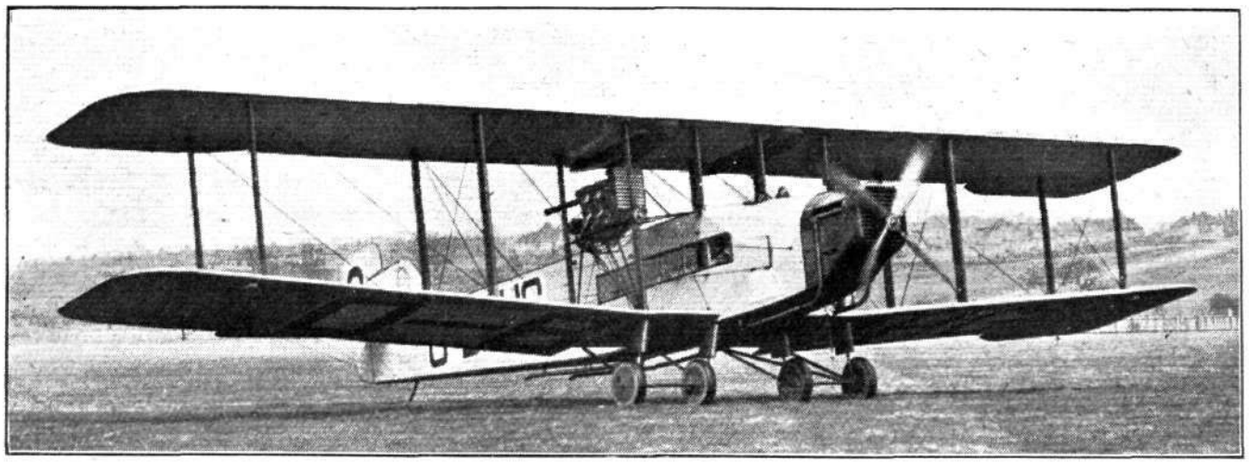
The "D.H.34" ten-seater has been employed with great success on the various air-line routes in Europe. The engine is a Napier "Lion."

air lines, and has done extraordinarily good work. It is a tractor biplane with Napier "Lion" engine, and has seating accommodation for nine passengers in a roomy cabin. The main dimensions are: Length o.a., 39 ft. (11·9 m.); span, 51 ft. (15·5 m.); wing area, 590 sq. ft. (55 m.²); weight, empty, 3,365 lbs. (1,530 kgs.); useful load, 10 passengers with luggage, or approximately 2,000 lbs. (910 kgs.); total loaded weight, 6,300 lbs. (2,860 kgs.). The cruising speed is approximately 105 m.p.h. (168 km./h.).

The D.H. 50 is a smaller machine, but is an extraordinarily efficient one. With a Siddeley "Puma" engine of but 240 h.p. it carries four passengers in addition to the pilot, and at a

The Gloucestershire "Gloster" won the 1923 Aerial Derby at a speed of slightly less than 200 m.p.h. The engine is a Napier "Lion."

FLIGHT
& AIRCRAFT ENGINEER



The Handley Page three-engined commercial aeroplane, fitted with one Rolls-Royce "Eagle" and two Siddeley "Pumas."

fairly high cruising speed. The passengers sit, two and two, on seats running across the cabin, and windows in the side give a good view. The pilot is placed aft of the cabin, and is able to communicate with the passengers through a small opening in the rear wall of the cabin. Recently the D.H. 50 has been fitted with a patented automatic variable camber gear, by which the wing curve and angle of incidence automatically adjust themselves to any particular flying speed. Fitted with this gear the D.H. 50 lands at about 42 m.p.h. (67 km./h.), and with its fuselage nearly horizontal. The main dimensions of the D.H. 50 are: Length o.a., 29 ft. 9 ins. (9·06 m.); wing span, 42 ft. 9 ins. (13 m.); wing area, 437 sq. ft. (40·6 m.²). The weight of the machine empty is 2,253 lbs. (1,022 kgs.); weight of fuel, 394 lbs. (180 kgs.); useful load, including pilot, 1,253 lbs. (570 kgs.). Total loaded weight, 3,900 lbs. (1,950 kgs.). The official performance figures (obtained at the British Air Ministry Experimental Station at Martlesham Heath) are as follows: Speed at 3,000 ft. (1,000 m.), 112 m.p.h. (180 km./h.); speed at 5,000 ft. (1,525 m.), 110·5 m.p.h. (177 km./h.); speed at 8,000 ft. (2,440 m.), 104·5 m.p.h. (167 km./h.); absolute ceiling, 17,300 ft. (5,270 m.). Climb to 3,000 ft. (1,000 m.) in 5 mins. 26 secs.; to 5,000 ft. (1,525 m.) in 9 mins. 48 secs.; to 8,000 ft. (2,440 m.) in 17 mins. 54 secs.; to 10,000 ft. (3,050 m.) in 24 mins. 51 secs.

THE GLOUCESTERSHIRE AIRCRAFT CO., LTD.

SEVERAL types of civil aircraft are produced by this firm, and, among others, mention must be made of the racing machines. The "Mars I" was the winner of the Aerial Derby of 1921 and 1922. The latter race was won at speed of 180 m.p.h. (288 km./h.). For the Aerial Derby of 1923 Mr. Folland designed the "Gloster," fitted, like the "Mars I," with Napier "Lion" engine. This machine won the race at an average speed of 192·4 m.p.h. (308 km./h.). That these machines are not mere racing "freaks" will be realised when it is pointed out that on official Air Ministry trials the "Mars I" climbed to 20,000 ft. (6,100 m.) in 12 mins. The main characteristics of the "Gloster" are: Length o.a., 20 ft. (6·1 m.); wing span, 20 ft. (6·1 m.); wing area, 165 sq. ft. (15·3 m.²). Weight loaded, 2,650 lbs. (1,200 kgs.).

Mr. Folland has also designed an aeroplane goods carrier, the "Mars VIII," fitted with Rolls-Royce "Eagle" engine. The special feature of this machine is the hinged fuselage, which folds sideways, giving absolutely free access to the cargo space of the machine.

HANDLEY PAGE, LTD.

THE Handley Page commercial aeroplanes have been successfully operated on various British air routes, the type W8 B having been most widely employed. This is a twin-engined biplane with Rolls-Royce "Eagle" engines.

A recent type produced is the three-engined machine designed for use in Belgian Congo. This machine, which is shown in the accompanying photograph, has a Rolls-Royce "Eagle IX" in the nose of the fuselage, and two Siddeley "Pumas" on the wings. The machine carries 10 passengers only, so that it is not particularly economical to operate. For the conditions obtaining in the Congo, however, absolute freedom from engine failure and forced landings was deemed essential, and this end is believed to be attained by the three-engined arrangement. The dimensions, etc., of the Handley Page three-engined machine are: Length o.a., 60 ft. (18·3 m.); wing span, 75 ft. (22·9 m.); wing area, 1,464 sq. ft. (136 m.²). The useful load, exclusive of petrol, is 2,550 lbs. (1,160 kgs.); total loaded weight, 13,000 lbs. (5,900 kgs.). The cruising speed is approximately 85 m.p.h. (136 km. h.).

THE SUPERMARINE AVIATION WORKS, LTD.

IN addition to their long series of military flying boats, the Supermarine Aviation Works have produced several civil types. First and foremost we have the racing machines which won the Schneider Cup race at Naples in 1922, and a

The Supermarine "Sea Eagle," with Rolls-Royce "Eagle IX" engine, is being used on the route between Southampton and the Channel Islands.

modified version which took part in the Schneider Cup race held at Cowes last September. Both these machines were fitted with Napier "Lion" engines, and both put up record performances for machines of the flying-boat type, although in the 1923 race the American twin-float seaplanes proved too fast to be beaten by the Supermarine "Sea Lion." Nevertheless this machine piloted by Capt. Biard put up a splendid fight, and covered one lap of the Schneider Cup triangular course at the excellent speed of 161 m.p.h. (258 km./h.). The actual maximum speed of the "Sea Lion" over a straight course is naturally considerably higher. The machine can be supplied as a single-seater fighter scout with amphibian land undercarriage, and is illustrated in this guise under the section dealing with military aircraft.

A recent commercial flying boat produced by the Supermarine Aviation Works is the "Sea Eagle" amphibian flying-boat, fitted with Rolls-Royce "Eagle IX" engine. This machine is being used by Imperial Airways, Ltd., on the Southampton-Guernsey route. A photograph of this machine is given herewith. Six passengers and a considerable quantity of luggage and goods are carried, and the fact that the machine is an amphibian should make it particularly suitable for commercial flying in many other parts of the world, where a route may lie alternately across sea and land. As in all Supermarine machines, particular attention has been paid to the question of seaworthiness, and the high bows of the "Sea Eagle" should assist materially in keeping the hull from boring under in a seaway.

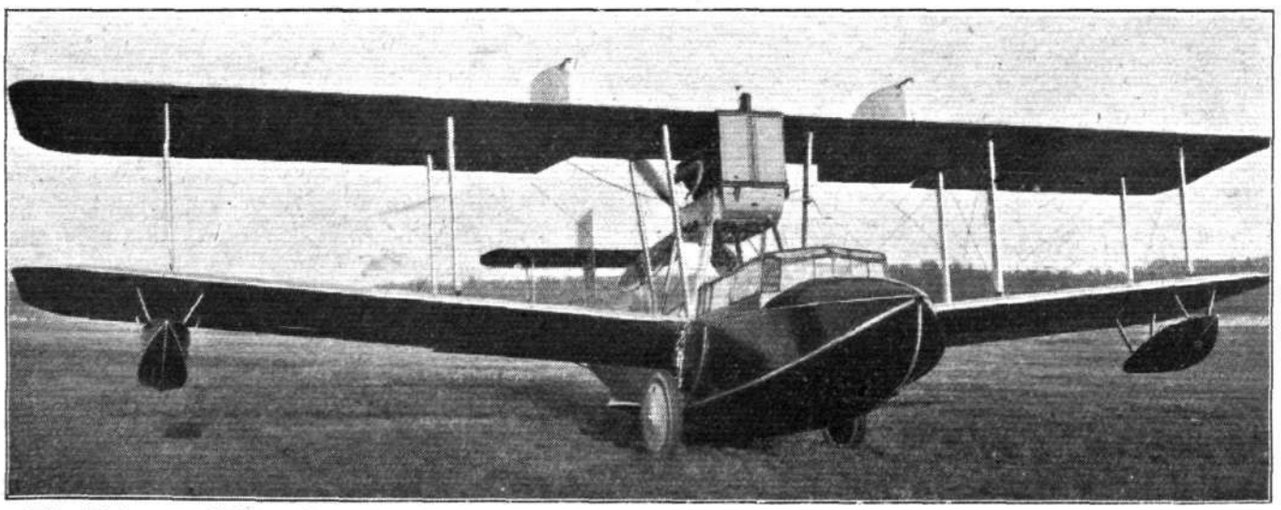
VICKERS, LTD.

Since the end of the Great War, Vickers, Ltd., have designed and built a number of commercial aircraft, both land machines and amphibian flying boats. The first Vickers post-war commercial aeroplane was the "Vimy-Commercial," fitted with two Rolls-Royce "Eagle" engines. This type, which was once upon a time used extensively in the air routes, had seating accommodation for 10 passengers.

Next in time followed the "Vulcan," a single-engined biplane, the first of which was fitted with Rolls-Royce "Eagle" engine and had seating accommodation for six passengers. A later type, fitted with Napier "Lion," carries eight passengers. This machine is shown in one of our photographs, and its main characteristics are :—Length o.a., 38 ft. (11·6 m.); wing span, 49 ft. (15 m.); wing area, 834 sq. ft. (77·5 m.).

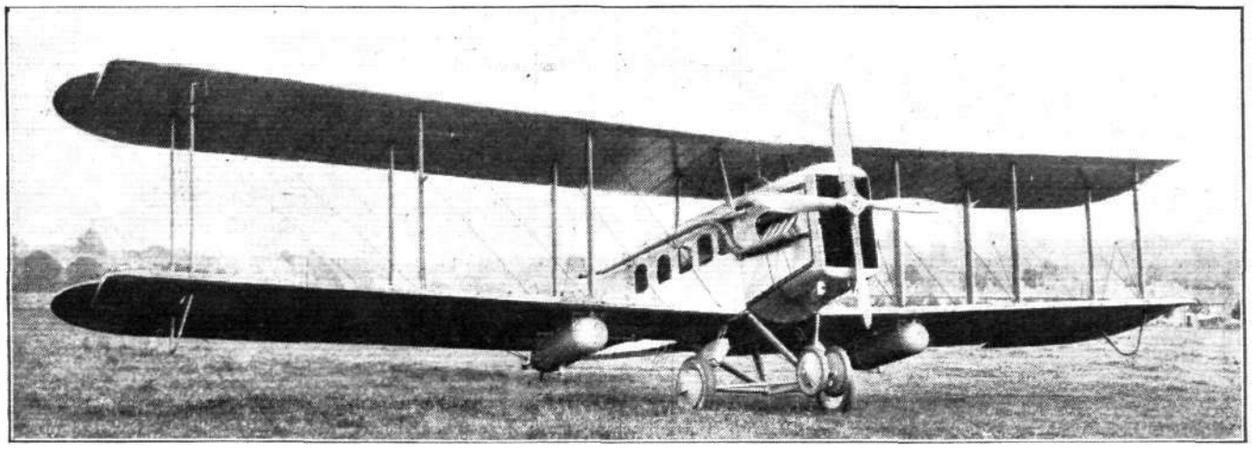
The Vickers "Vulture," Napier "Lion" engine, on which the flight around the world is being attempted.

The Vickers "Vulcan," in its latest form, is an eight-seater passenger machine, with Napier "Lion" engine.



The Vickers "Viking Commercial" is very similar to the service type, and can also be supplied fitted with a Rolls-Royce "Eagle IX" engine.

FLIGHT & AIRCRAFT ENGINEER



The Westland limousine won the Air Ministry trials for commercial aeroplanes. One of these machines has been used with great success in Newfoundland by Capt. S. Cotton.

Weight empty, 4,400 lbs. (2,000 kgs.). Total loaded weight, 6,750 lbs. (3,070 kgs.). Maximum speed, 112 m.p.h. (179 km./h.); minimum speed, 46 m.p.h. (74 km./h.). The range at cruising speed is 350 miles (560 km.).

A very large passenger-carrying machine, the "Vanguard," has been designed to an Air Ministry specification. In general appearance this machine is similar to the "Vimy-Commercial," but is, of course, very much larger, being designed to carry 23 passengers and 2 pilots. The passengers are accommodated in a large enclosed cabin, with windows along the sides, and the pilots occupy an open cockpit in the nose of the fuselage. The two engines are Napier "Lions" placed on the wings. Some idea of the size of the machine may be formed from the following dimensions:—Length o.a., 53 ft. 10 in. (16·4 m.); wing span, 88 ft. (26·8 m.); wing area, 2,182 sq. ft. (203 m.²). The weight of the machine empty is 10,900 lbs. (4,960 kgs.); the total loaded weight is 17,600 lbs. (8,000 kgs.). The type tests of this machine have not yet been completed, but it is expected that approximately the following performance will be realised:—Maximum speed, 100 m.p.h. (160 km./h.); minimum speed, 47 m.p.h. (75 km./h.). Climb to 5,000 ft. (1,525 m.) in 21 minutes. Range at cruising speed, 470 miles (750 km.).

Very similar in general appearance to the "Viking IV" is the Vickers "Viking-Commercial," a single-engine amphibian flying-boat, which can be supplied either with Napier "Lion" or Rolls-Royce "Eagle" engine. The commercial type is of exactly the same dimensions as the "Viking IV," which see, but as the useful load is greater, the total loaded weight of the commercial type is somewhat greater, being 6,000 lbs. (2,730 kgs.) in the "Lion"-engined machine and 5,600 lbs. (2,550 kgs.) in the "Eagle"-engined type. The speeds of the two types are 107 m.p.h. (182 km./h.) and 102 m.p.h. (163 km./h.) respectively. The paying loads carried are 1,126 lbs. (512 kgs.) and 756 lbs. (345 kgs.) respectively, exclusive of weight of fuel.

The latest version of the Vickers "Viking" is the "Vulture," on which Squadron-Leader MacLaren is at present attempting the flight around the world. This machine has a slightly larger area, and the boat hull is of wider beam to give better water performance.

THE WESTLAND AIRCRAFT WORKS, LTD.

THIS firm has not produced commercial aeroplanes during the last two years or so, having been engaged upon the design and construction of experimental military types. Several Westland commercial aeroplanes were, however, produced shortly after the War, and it may be mentioned that one of them, the large six-seater with Napier "Lion" engine, shown in the accompanying photograph, won the Air Ministry competition for commercial aeroplanes (small class) in 1920. This machine was later taken out to Newfoundland, where it did excellent work in aerial surveying, seal spotting, &c., Smaller versions with seating accommodation for four passengers, and fitted with Rolls-Royce or Hispano-Suiza engines have also been built and have been used on the British Air Line routes.

BRITISH AERO ENGINES

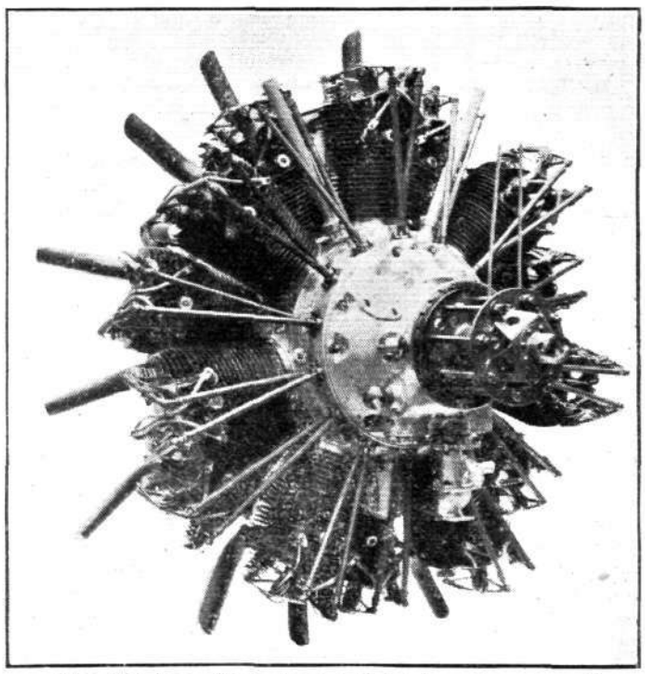
[In this section will be found particulars such as power, weight, consumption, etc., of all the modern British aero engines, so that designers who are on the look-out for suitable power plants should have no difficulty in choosing an engine for any particular machine or purpose. The type tests upon which the British Air Ministry insists before granting an airworthiness certificate are of such a searching character that any engine which succeeds in passing these tests and obtains its airworthiness certificate may be considered to have proved its reliability and all-round excellence. Firms whose name is marked with an * are exhibiting at Prague.—ED.]

ARMSTRONG-SIDDELEY MOTORS, LTD.*

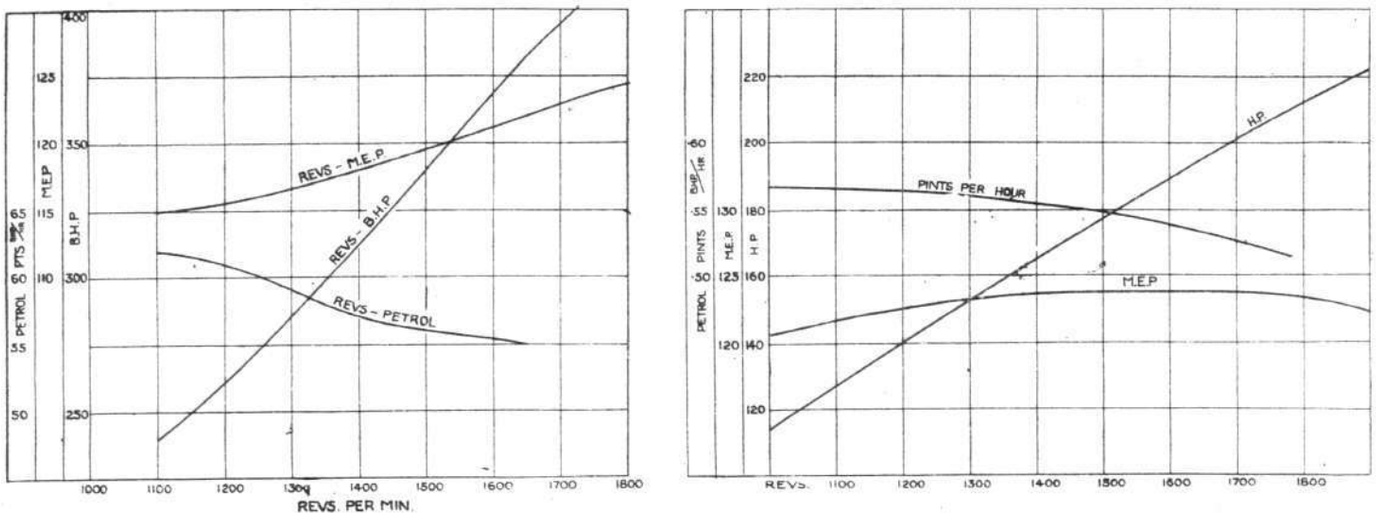
OF recent years this firm has concentrated upon two sizes of engine, both of the radial air-cooled type, the "Jaguar" of 385-400 h.p. and the "Lynx" of 175 h.p. The larger engine is a 14-cylinder radial, while the smaller is a seven-cylinder radial.

The Armstrong-Siddeley "Jaguar" develops 385 b.h.p. at the normal speed of 1,700 r.p.m. The weight of the engine dry is 780 lbs. (355 kgs.). The cylinders have a bore of 5 ins. (127 mm.) and a stroke of 5·5 ins. (140 mm.). The petrol consumption is 0·525–0·55 pint per b.h.p. per hour (0·298–0·312 litre per b.h.p. per hour), and the oil consumption 0·03 pint (0·017 litre) per b.h.p. hour. The overall diameter of the "Jaguar" is 44 ins. (1,180 mm.) and the total length is 43 ins. (1,080 mm.).

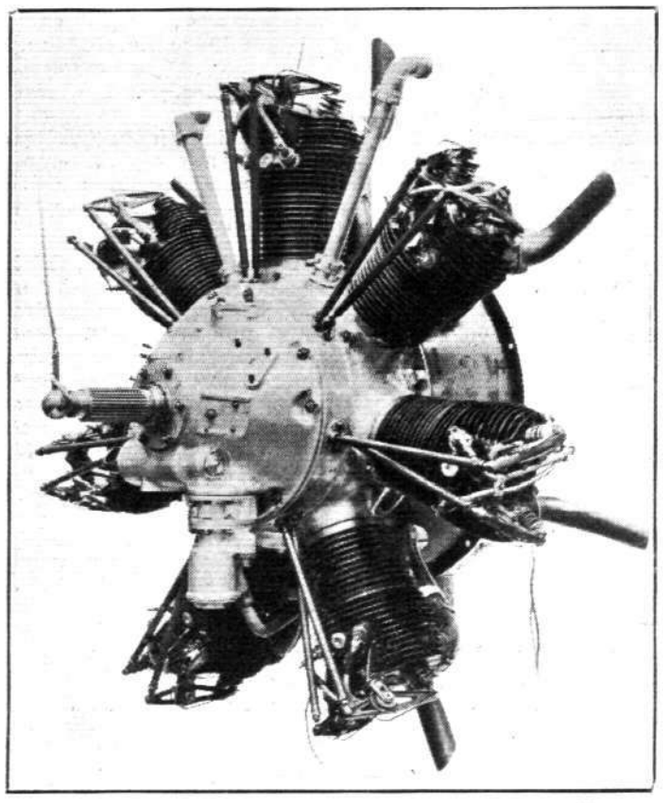
The seven-cylinder 175 h.p. "Lynx" weighs complete 460 lbs. (209 kgs.), and develops its rated horse-power at a normal speed of 1,600 r.p.m. The petrol consumption is



The 360 h.p. Armstrong-Siddeley "Jaguar."



THE ARMSTRONG-SIDDELEY AERO ENGINES: On the left a running chart of the 360 h.p. "Jaguar," and on the right power curves, etc., of the 175 h.p. "Lynx."



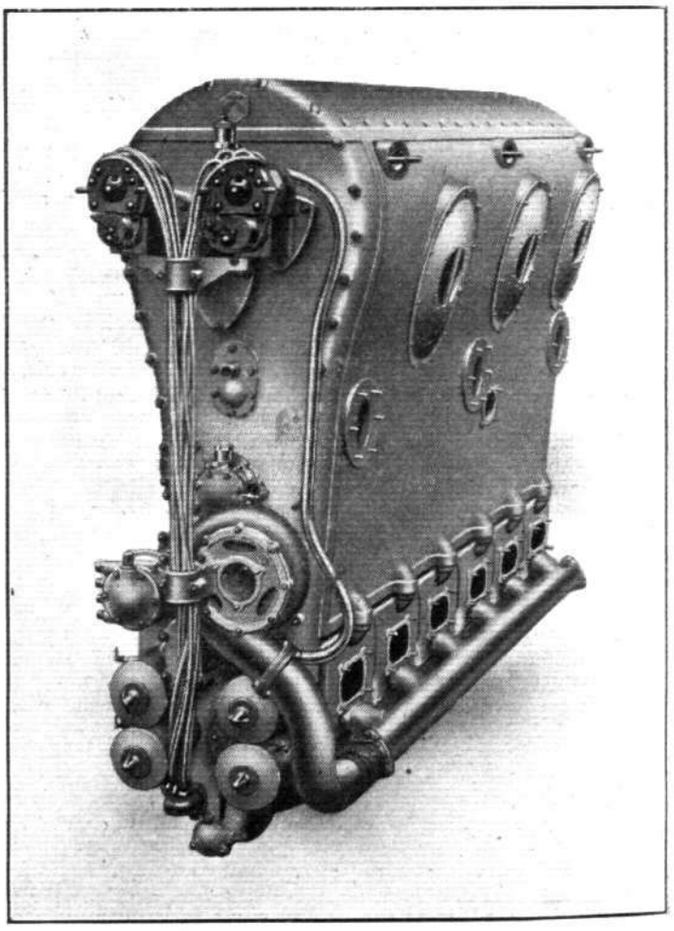
The 175 h.p. Armstrong-Siddeley "Lynx."

0·55 pint (0·312 litre) per b.h.p. per hour, and the oil consumption 0·03 pint (0·017 litre) per b.h.p. per hour. The overall diameter of the "Lynx" is 43 ins. (1,090 mm.).

WM. BEARDMORE AND CO., LTD.

BEFORE the War the famous firm of Beardmore took up aero engine work by obtaining the agency for the Austro-Daimler aero engines of 120 h.p. During the War the original engine was greatly improved upon, and a slightly larger and more powerful type, the 160 h.p. engine, was developed. Then followed a period during which the public heard but little of what was being done by the Beardmore aero engine department. The firm was not idle, however, and Mr. Alan Chorlton, chief of the aero engine department, was looking ahead, instead of to the present or the immediate future. He became convinced that the Diesel, or semi-Diesel, type of engine might be a possible aircraft engine, and the result was that Beardmores commenced a series of experiments, first with single-cylinder units and later with a complete six-cylinder engine. The greatest secrecy has been maintained concerning the work on the application of the semi-Diesel principle to aero engines. The question of weight was naturally a serious one, but already Beardmores have advanced so far that it is possible to state that an engine can be built which is not prohibitively heavy. Details are not available, but the accompanying photograph, the first to be published in FLIGHT, shows the "Typhoon" aero engine.

The advantages which may be expected from an engine working on the Diesel or semi-Diesel principle may be briefly summed up as follows: Greater reliability, better fuel economy, and the possibility of employing a fuel considerably cheaper than petrol. It also appears likely that the risk of fire should be smaller by employing a fuel with much higher flash point, so that, altogether, the development of a semi-Diesel aero engine may well have the most far-reaching effects upon the future of commercial aviation. Beardmores are to be congratulated upon being the first British firm to undertake the development of an engine of this type.

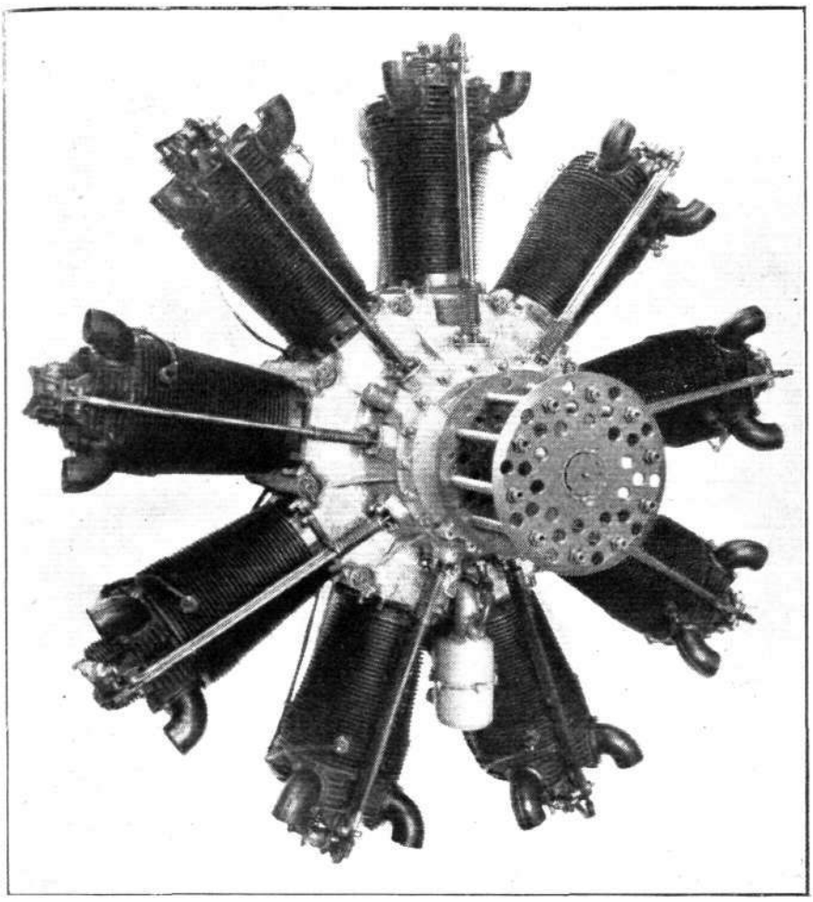


The Beardmore "Typhoon" Semi-Diesel Aero Engine.

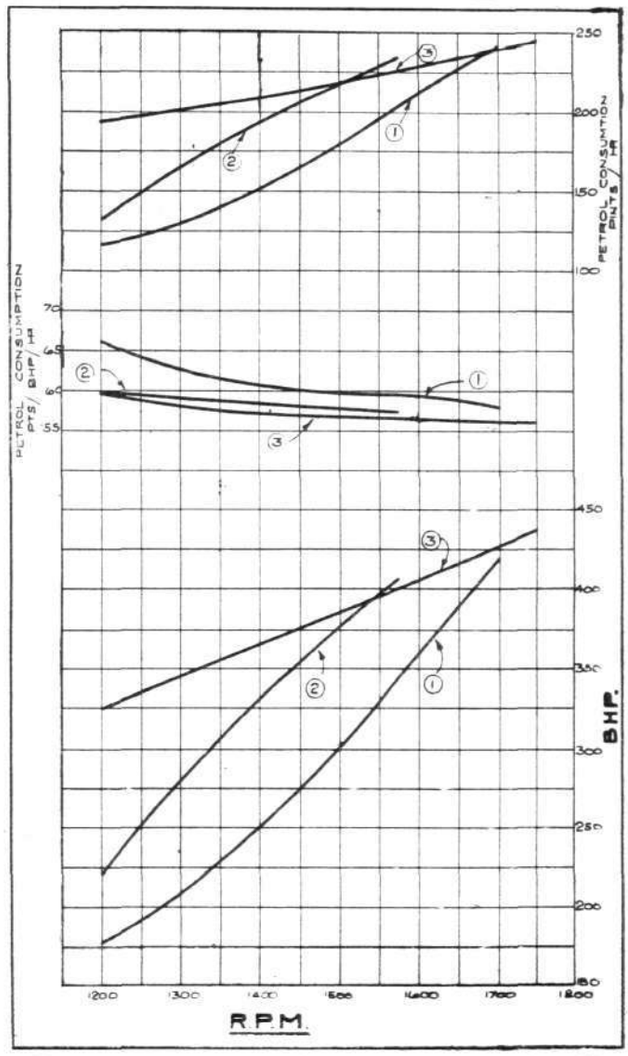
FLIGHT
THE AIRCRAFT ENGINEER AIRSHIPS

THE BRISTOL AEROPLANE CO., LTD.

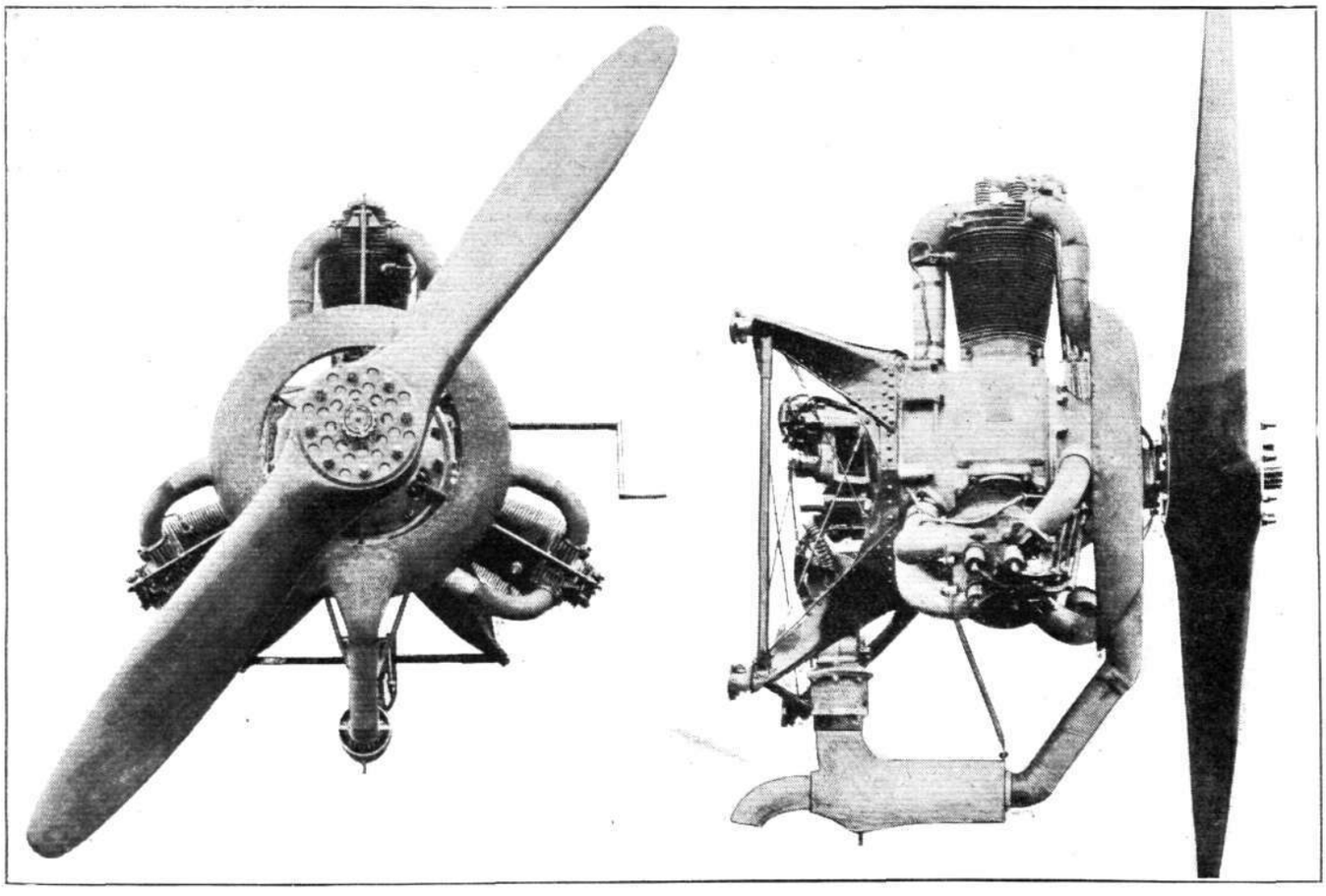
THREE types of aero engines are now being manufactured by the Bristol Aeroplane Company—the 400 h.p. "Jupiter," the 100 h.p. "Lucifer," and the 30 h.p. "Cherub." Of these the first two only will be dealt with in this section of our



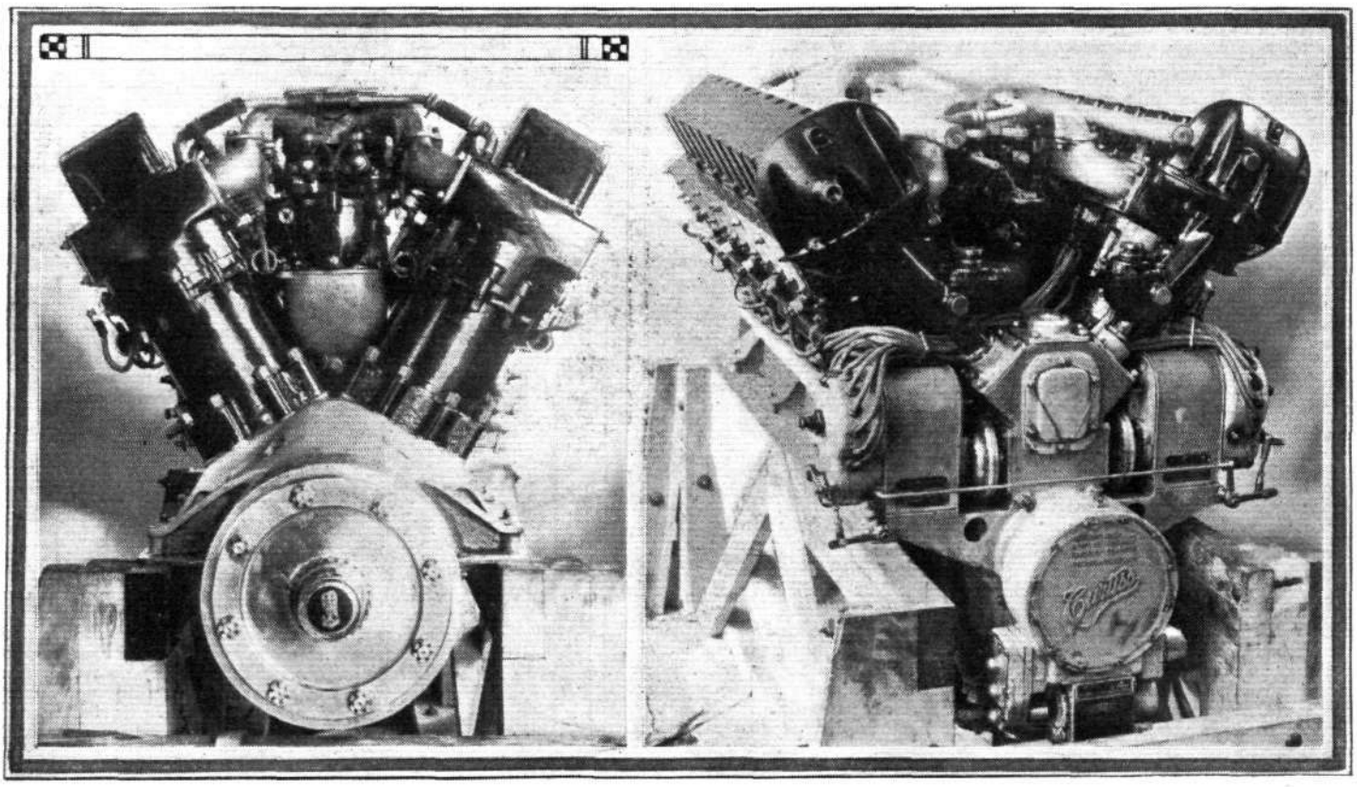
The 400 h.p. Bristol "Jupiter."



Power curves, etc., of the Bristol "Jupiter."



Two views of the 100 h.p. Bristol "Lucifer" on swivelling engine mounting supplied as standard.



Front and rear views of the 500 h.p. Fairey "Felix."

article, the 2-cyl. "Cherub" being a light 'plane engine, and its description, therefore, being given at the end of the present section.

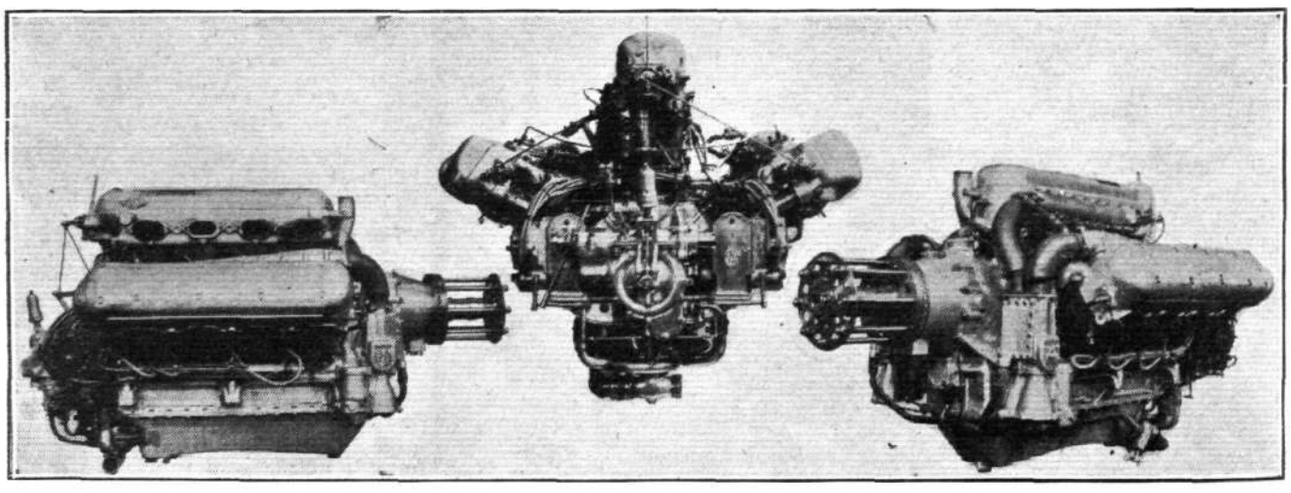
The "Jupiter" is a nine-cylinder radial air-cooled engine possessing many unusual features, among which the chief is, perhaps, the peculiar spiral induction manifold, by means of which each of the three carburettors supplies three cylinders. Space does not permit of a detailed description, but the following figures relating to dimensions, weights, etc., should be of interest. The weight of the "Jupiter" is 730 lbs. (332 kgs.), and the power developed at various speeds will be found from the accompanying power curves. It should be pointed out that these curves were obtained from a standard engine, and that throttle curves 1 indicate readings taken with the dynamometer set at 90 per cent. of the rated horse-power (*i.e.*, 344 b.h.p. at 1,575 r.p.m.). Curves 2 indicate readings taken with the dynamometer set at full power at 1,575 (*i.e.*, normal) r.p.m. Curves 3 are full throttle power curves. It will be seen that at full throttle the "Jupiter" develops 400 h.p. at 1,575 r.p.m. The cylinders have a bore of 5·75 ins. (146 mm.) and the stroke is 7·5 ins. (190 mm.). The petrol consumption is 0·594 pint (0·339 litre) per b.h.p. per hour, and the oil consumption 0·049 pint (0·028 litre) per b.h.p. per hour.

The Bristol "Lucifer" is a three-cylinder radial air-cooled engine of 100 h.p., and its simplicity and very small number of parts render it specially suitable for school machines or for fairly low-powered sporting aeroplanes. The main characteristics of the "Lucifer" are: Bore 5·75 ins. (146 mm).; stroke, 6·025 ins. (153 mm.). Compression ratio, 4·8 to 1. Normal b.h.p. at 1,600 r.p.m., 100 h.p. Petrol consumption, 0·61 pint (0·35 litre) per b.h.p. per hour. Oil consumption, 0·036 pint (0·021 litre) per b.h.p. per hour. Weight, 324 lbs. (147 kgs.). Weight per h.p. 3·24 lbs. (1·47 kgs.).

THE FAIREY AVIATION CO., LTD.

THE British manufacturing rights for the Curtiss D.12 aero-engine were secured by Mr. C. R. Fairey a short time ago, and in the future this engine will be manufactured in Great Britain, where it will be known as the Fairey "Felix." The engine is a 12-cylinder water-cooled V-type of very small frontal area and of very low specific weight.

The overall length of the "Felix" is 56·75 ins. (1·45 m.) and the width is but 28·25 ins. (730 mm.). The bore and stroke are 4·5 ins. (114 mm.) and 6 ins. (152 mm.) respectively, and the weight complete with propeller hub and water is 724 lbs. (329 kgs.). The brake horse-power at sea level and at 2,000 r.p.m. is 415 h.p., and the maximum power is 470 h.p. at 2,300 r.p.m. The petrol consumption at full throttle is 0·58 lb. (263 gr.) per h.p. per hour, and the oil consumption is



Three views of the Napier "Lion."

0·015 lb. (68 gr.) per h.p. per hour. These figures relate to a fuel consisting of 50 per cent. aviation spirit and 50 per cent. benzole.

D. NAPIER AND SONS, LTD.*

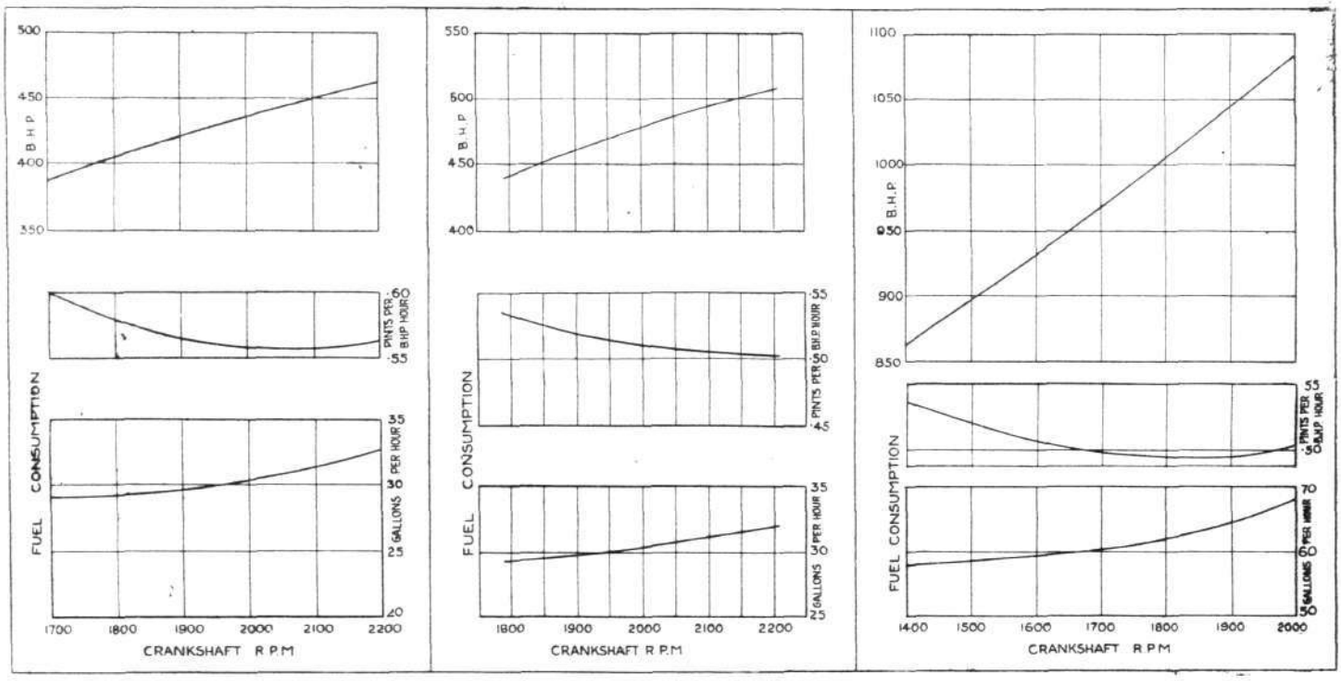
ONE of the most famous aero engines in the world today is undoubtedly the Napier "Lion." Of the "Broad Arrow" or "W" type, this engine has its 12 cylinders arranged in three banks of 4 each. The resulting engine is very short and compact, and as the weight is very low and the reliability good, the popularity of the "Lion" is easily explained.

The principal dimensions, etc., of the Napier "Lion" are: Bore and stroke 5·5 ins. (140 mm.) and 5·125 ins. (130 mm.) respectively. The power developed at various speeds, the fuel consumption, etc., are shown in the accompanying power curves. The low-compression engine has a compression ratio of 5·0 to 1, and the high-compression type a compression ratio of 5·8 to 1. It will be observed that the high-compression type develops 500 h.p. at 2,150 r.p.m., while the low-compression type develops 450 b.h.p. at 2,100 r.p.m. The weight of the engine complete is 900 lbs. (410 kgs.).

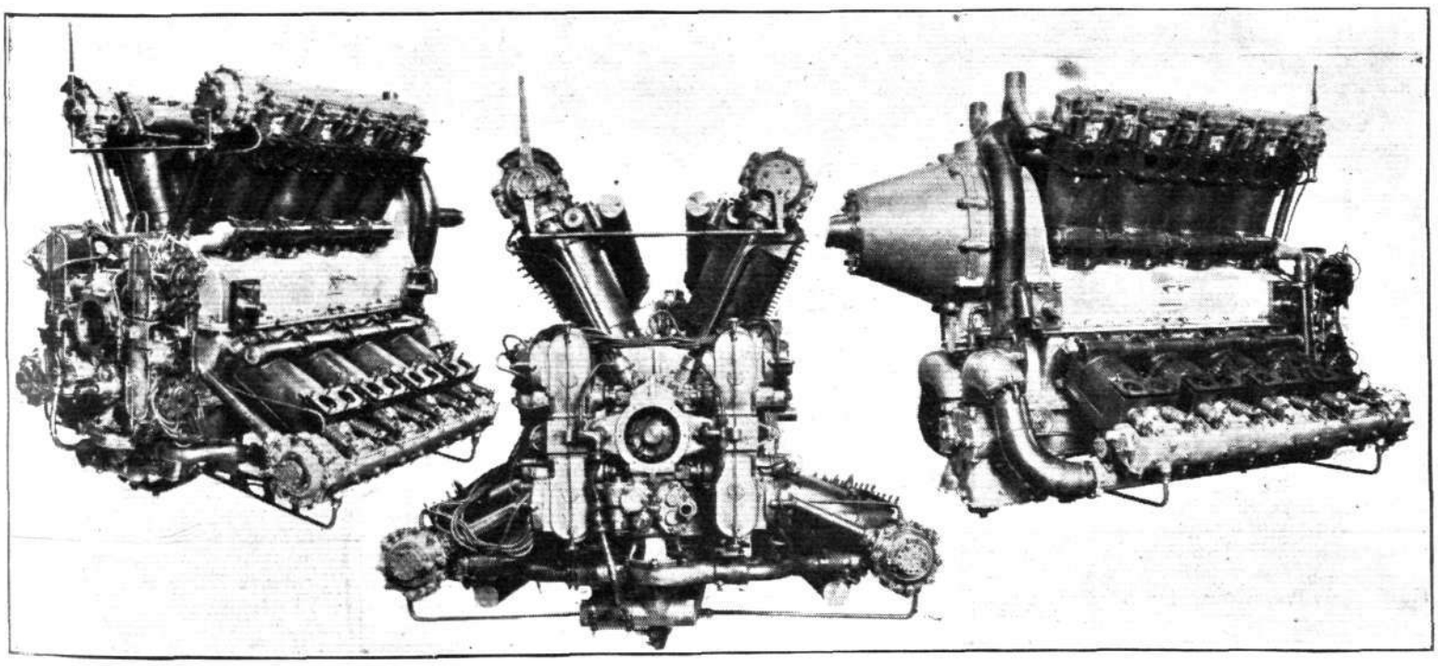
The 16-cylinder Napier "Cub" has its cylinders arranged in the form of an unsymmetrical X as seen from in front, each bank being composed of four cylinders. The normal power developed is 1,000 b.h.p. at 1,800 r.p.m., and the "Cub" is thus the most powerful engine in the world to be employed on military aircraft. The accompanying curves show the power, fuel consumption, etc., but it should be mentioned that the compression ratio is 5·3 to 1. The bore and stroke are 6·25 ins. (159 mm.) and 7·5 ins. (190 mm.) respectively. The weight of the engine is approximately 2,450 lbs. (1,110 kgs.), and this figure includes airscrew boss, carburettors, induction pipes, magnetos, starting distributor gear and pipes, but does not include water.

ROLLS-ROYCE, LTD.*

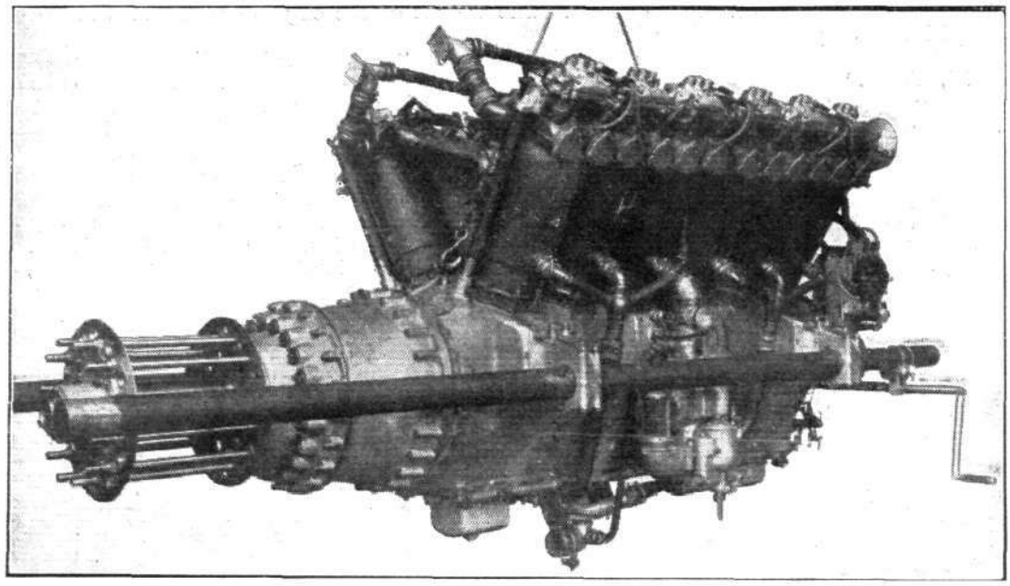
ROLLS-ROYCE aero engines have always enjoyed an excellent reputation for reliability, and in this connection it should be



Power curves, etc., of the Napier Aero engines. On the left the curves of the low-compression "Lion" (5·0 to 1). In the centre the curves relating to the high-compression "Lion" (5·8 to 1), and on the right the curves of the 1,000 h.p. "Cub." The fuel used in each case was a mixture of 80 per cent. aviation spirit and 20 per cent. benzole.



Three views of the 1,000 h.p. Napier "Cub."

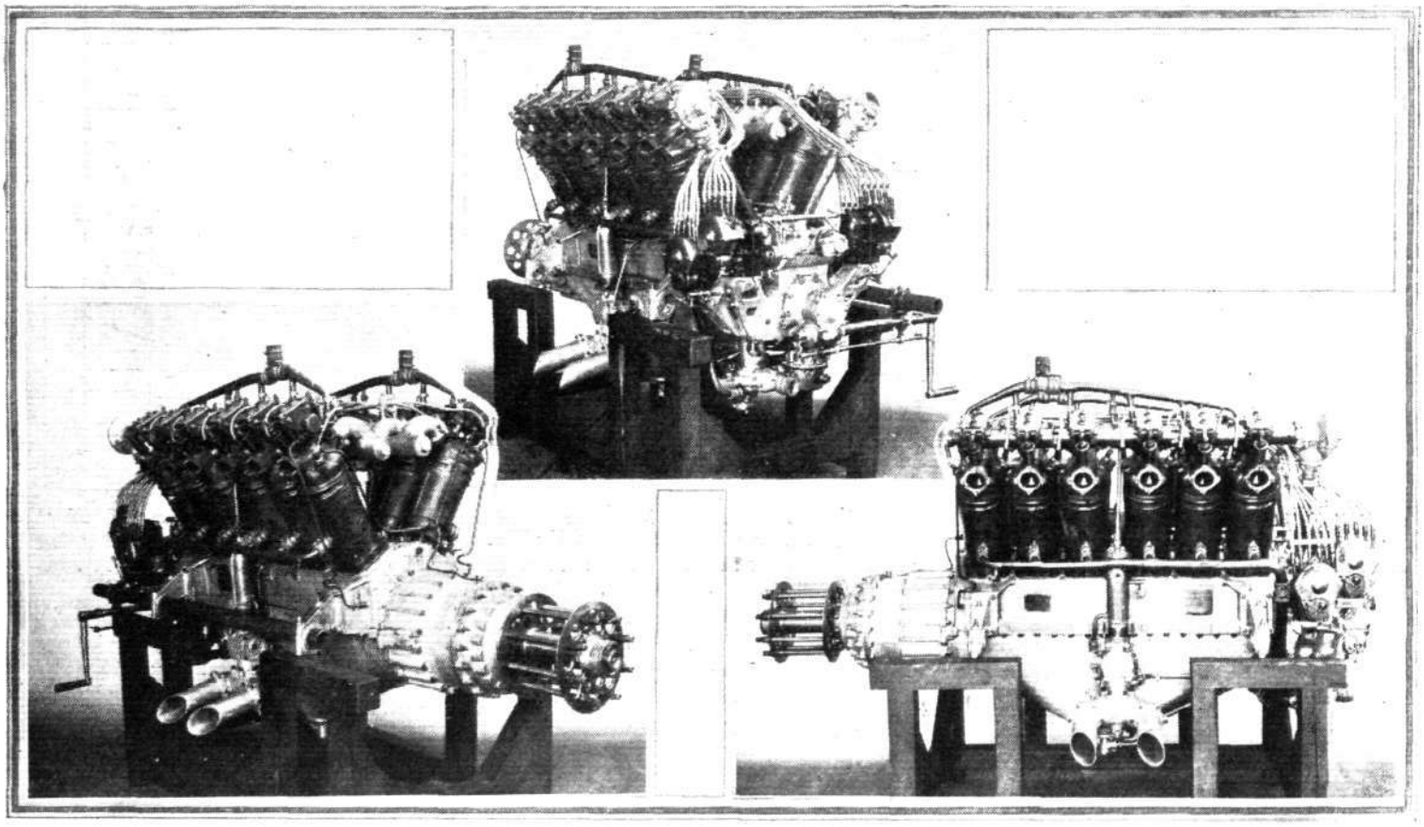


The Rolls-Royce "Condor III."

without water. Its petrol consumption at ground level and at normal r.p.m. and b.h.p. is 18 gallons (82 litres) per hour, and the oil consumption is 0·75 gallon (3·42 litres) per hour.

The Rolls-Royce "Condor," series III, is, like the smaller engines, a 12-cylinder, water-cooled Vee type. It is, however, a much larger engine, developing 650 h.p. at the normal speed of 1,900 r.p.m. The bore is 5·5 ins. (140 mm.) and the stroke 7·5 ins. (190 mm.). The weight of the "Condor III" complete, but without radiator, airscrew and water, is 1,336 lbs. (610 kgs.). The petrol consumption at normal power and speed is 45 gallons (205 litres) per hour, and the oil consumption 1·9 gallons (8·66 litres) per hour.

All three Rolls-Royce aero engines are fitted with reduction gear for the propeller.



Three views of the Rolls-Royce "Eagle IX."

remembered that the great British flights of 1919—the trans-Atlantic flight, the London-Australia flight, the Cairo to Cape flight, etc., as well as the Portugal–S. America flight—were made in machines fitted with Rolls-Royce "Eagle VIII" engines. Since that time an improved version, the "Eagle IX" has been produced. This engine has been especially designed for the conditions obtaining in commercial aviation, and is considered to be an improvement upon the famous "Eagle VIII." The "Eagle IX" is a 12-cylinder water-cooled V-type, with a bore and stroke of 4·5 ins. (114 mm.) and 6·5 ins. (164 mm.) respectively. The normal power is 360 h.p., at 1,800 r.p.m., and the maximum permissible power is 398 h.p. at 2,000 r.p.m. The weight of the engine complete, but without water, is 965 lbs. (440 kgs.), and the petrol consumption at ground level and at normal b.h.p. and r.p.m. is 25 gallons (116·5 litres) per hour. The oil consumption is 1 gallon (4·56 litres) per hour.

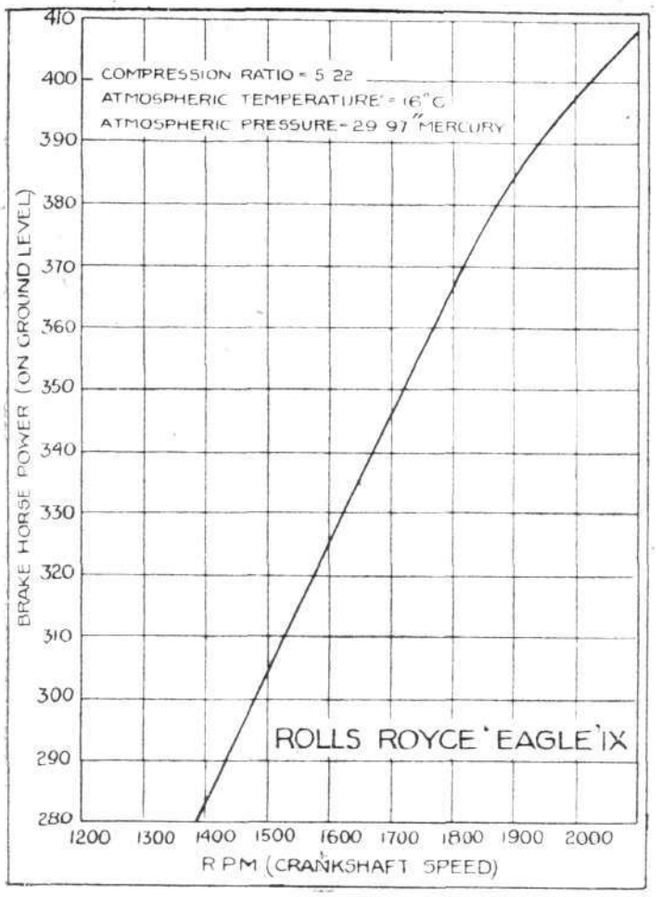
A smaller engine, the "Falcon III," develops 250 h.p. at 1,800 r.p.m. and weighs 705 lbs. (320 kgs.) complete but

THE SUNBEAM MOTOR CAR CO., LTD.

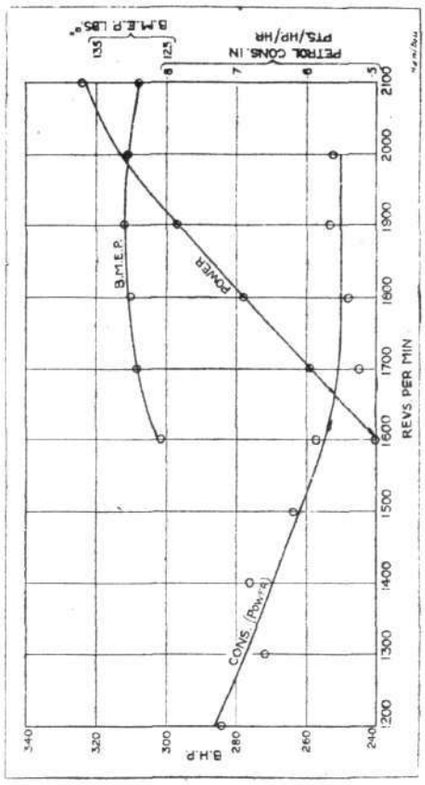
AMONG the large number of types manufactured by this firm it is only possible to give data of three, the "Dyak" of 100 h.p., the "Maori" of 275 h.p., and the 300 h.p. "Manitou." The "Dyak" is a vertical 6-cylinder water-cooled engine, while the other two are 12-cylinder water-cooled Vee type engines.

The "Dyak" has a bore of 120 mm. and a stroke of 130 mm., and develops 110 b.h.p. at the normal speed of 1,200 r.p.m. The maximum permissible speed is 1,400 r.p.m., at which the engine develops 115 h.p. The weight of the engine dry is 340 lbs. (154 kgs.). The petrol consumption is 0·54 pint (0·31 litre) per horse-power per hour, and the oil consumption 0·02 pint (0·0114 litre) per horse-power per hour. The compression ratio is 5·45 to 1.

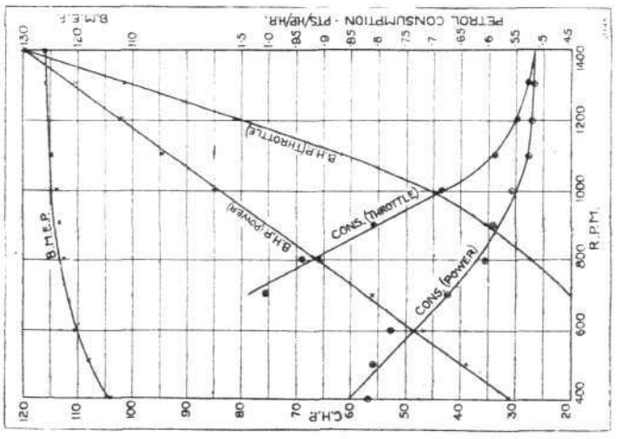
The Sunbeam "Maori" develops 275 h.p. at a normal speed of 2,000 r.p.m., and a maximum of 280 h.p. at 2,100 r.p.m. The bore and stroke are 100 mm. and 135 mm. respectively, and the compression ratio is 5·0 to 1. The weight of the



Power curve of the Rolls-Royce "Eagle IX."

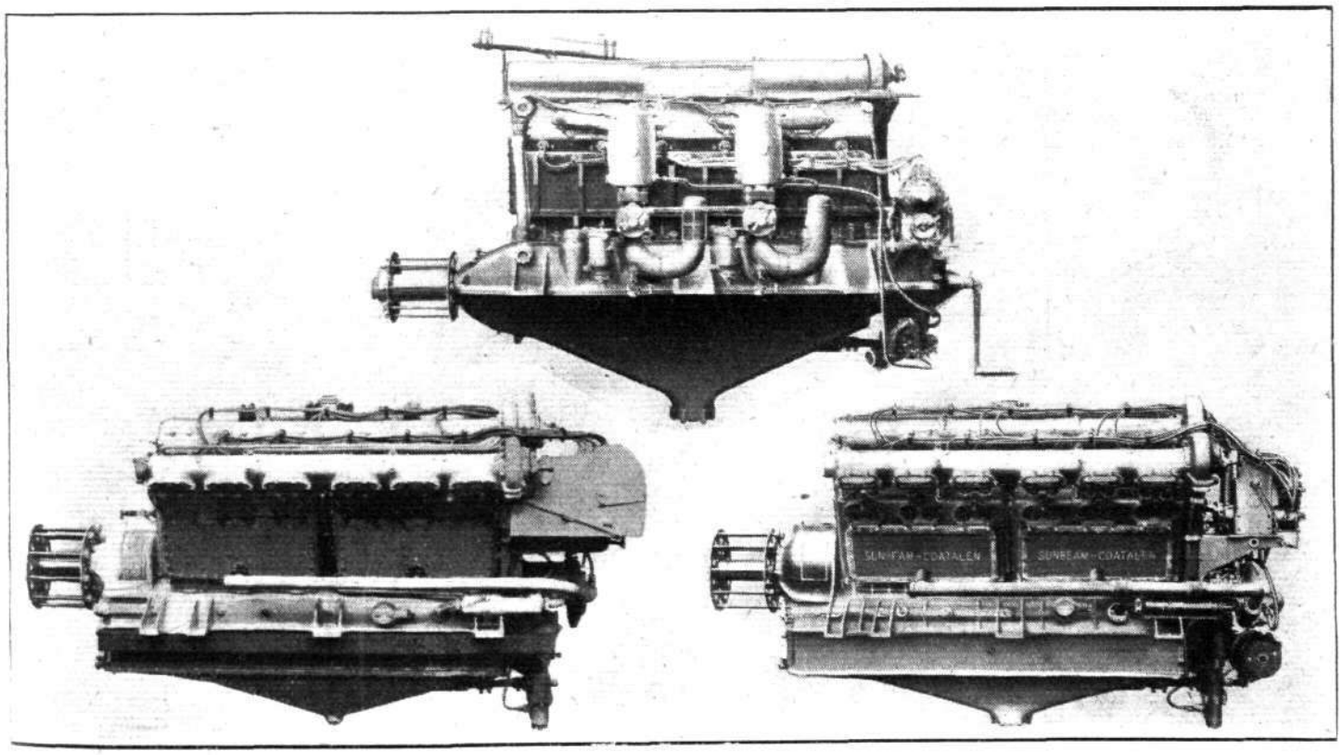


POWER CURVES OF TWO SUNBEAM AERO ENGINES : On the left the curves of the "Dyak," and on the right the "Manitou" curves.



engine dry is 920 lbs. (417 kgs.) and the fuel consumption is 0·54 pint (0·31 litre) per horse-power per hour. The oil consumption is 0·04 pint (0·023 litre per horse-power per hour.

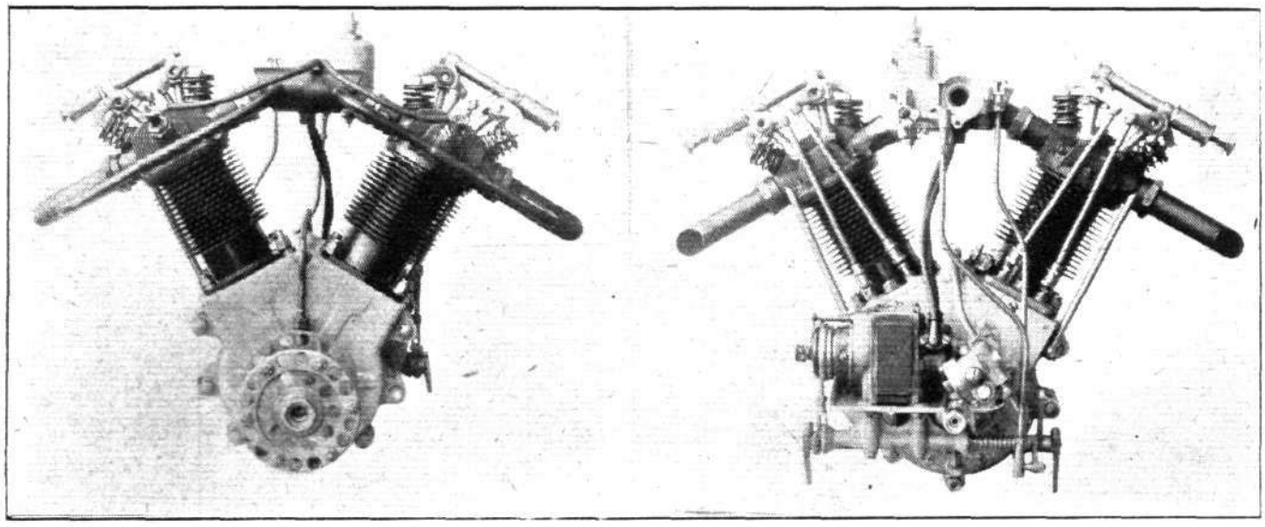
The "Manitou" develops 300 h.p. at normal speed of 2,000 r.p.m. and weighs 845 lbs. (384 kgs.) dry. The petrol consumption is 0·55 pint (0·313 litre) per horse-power per hour, and the oil consumption 0·029 pint (0·017 litre) per horse-power per hour. The compression ratio is 5·2 to 1.



THREE SUNBEAM AERO ENGINES : Top, the 100 h.p. "Dyak." On the left the 280 h.p. "Maori III," and on the right the 300 h.p. "Manitou."

LIGHT 'PLANE ENGINES

[In the following notes brief particulars are given of two small engines which have been proved suitable for light aeroplanes, and of one engine which is as yet experimental. One of these engines was originally designed for motor-cycle work, but has been adapted for use in aircraft.—Ed.]

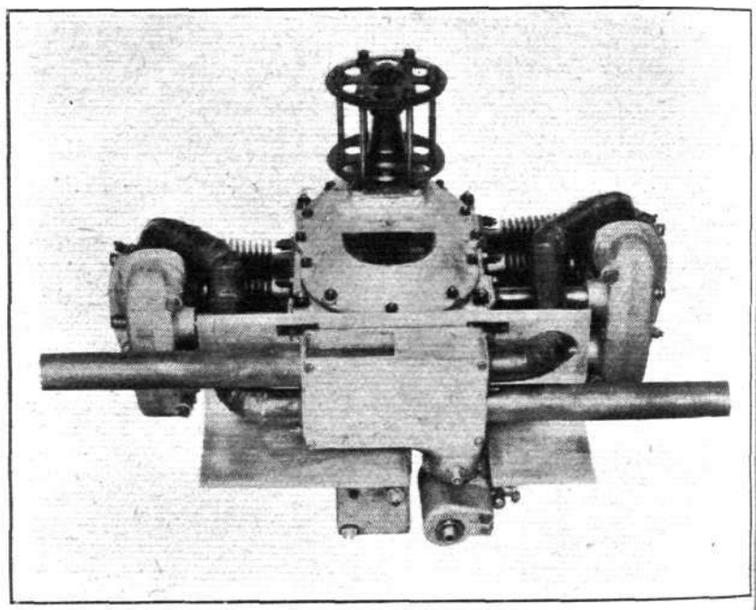


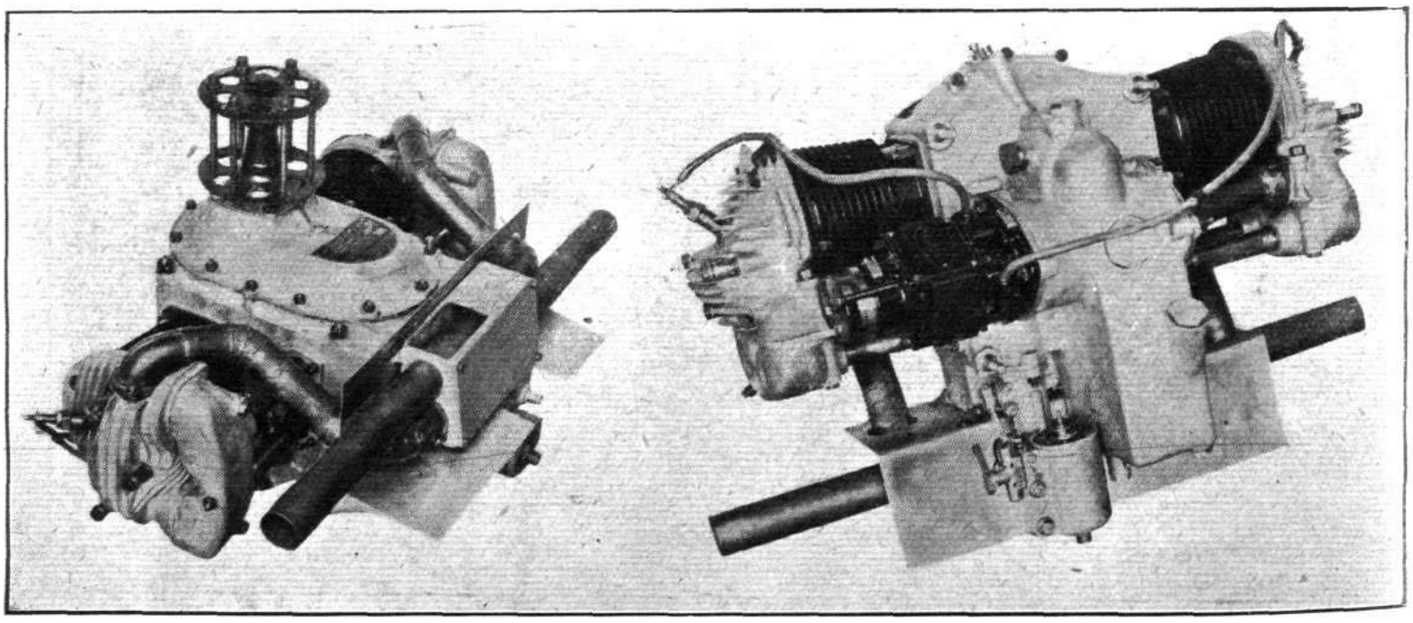
Two views of the Blackburne "Tomtit" engine, 696 c.c. capacity.

THE BLACKBURNE ENGINES

The engine which undoubtedly gave the most satisfactory performance at the light 'plane trials at Lympne in 1923 was the 696 c.c. Vee-twin designed and built by Burney and Blackburne, Ltd., of Bookham, Surrey. These engines were the original Blackburne motor-cycle engines, and were more or less crudely adapted. Since then the engine has been somewhat modified, and as a light 'plane engine has been marketed under the name the "Tomtit." In its new form the engine looks as shown in the accompanying photographs. The engine capacity is 696 c.c., the bore and stroke being 71 mm. and 88 mm. respectively. The power developed at normal speed of 2,400 r.p.m. is 16 h.p. and the maximum permissible speed is 3,600 r.p.m., at which speed the "Tomtit" develops 24 h.p. The fuel consumption is 0·58 pint (0·33 litre) per horse-power per hour, and the oil consumption 0·035 pint (0·02 litre) per horse-power per hour. The weight of the engine complete is 75 lbs. (34 kgs.).

A new engine is now being developed by Burney and Blackburne. This will be a 3-cylinder radial air-cooled, with a bore of 69·4 mm. and a stroke of 96·8 mm. The capacity will thus be 1,096 c.c. This engine has been designed to come within the limit of 1,100 c.c. fixed for the 1924 light 'plane two-seater competitions to be held at Lympne in September. The weight of the 3-cylinder engine is 98 lbs. (44·5 kgs.). The fuel consumption is 0·55 pint (0·313



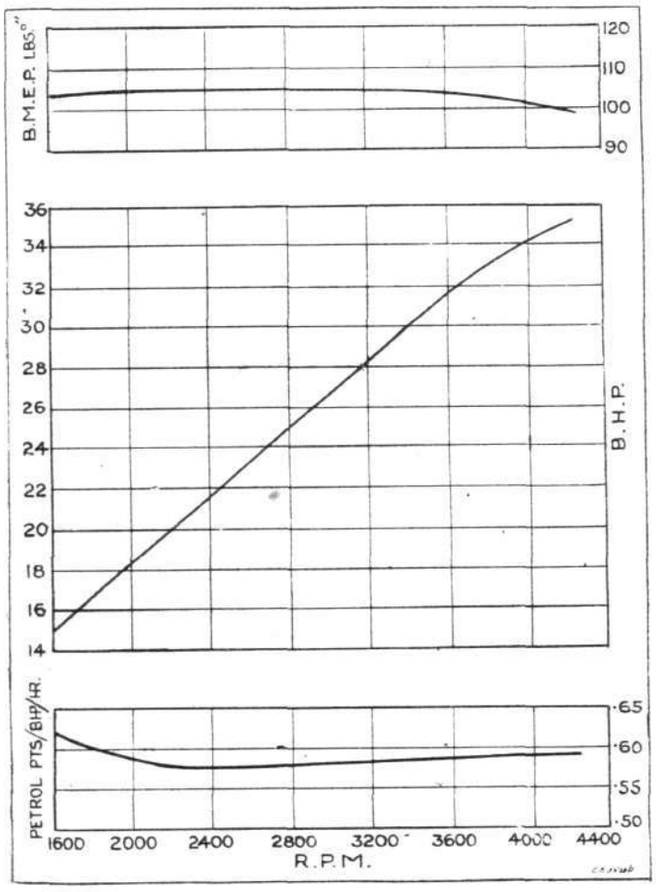


Front and rear views of the new Bristol "Cherub" light 'plane engine. Above, view from underneath.

litre) per horse-power per hour, and the oil consumption 0·03 pint (0·017 litre) per horse-power per hour. This engine has direct drive. No figures are available yet relating to power and speed.

THE BRISTOL "CHERUB"

WE have been fortunate enough to secure from the Bristol Aeroplane Co. the accompanying photographs of the new Bristol "Cherub" light 'plane engine. These photographs have not been published before, and show the engine as it will appear in the 1924 light 'plane trials. Unfortunately, space does not permit a detailed description of this engine in the present issue of FLIGHT, and such description must be reserved for a future occasion. The following brief particulars should, however, give a fair idea of the "Cherub," which, it should be noted, has been specially designed for use in light aeroplanes.



Power and petrol consumption curves of the Bristol "Cherub."

The bore and stroke of the "Cherub" are 85 mm. and 96·5 mm. respectively, giving a total capacity of 1,095 c.c. The compression ratio is 5·5 to 1, and the engine develops 22 b.h.p. at a normal speed of 2,500 r.p.m. The maximum permissible speed is 4,000 r.p.m. when the engine develops 34 b.h.p. At normal revolutions and power the "Cherub" consumes 1·4 gallons (6·38 litres) of petrol per hour, and 0·5 pint (0·28 litre) of oil. The weight of the "Cherub" is 81 lbs. (36·8 kgs.).

It is of interest to mention that the older type of "Cherub" has some extraordinarily good performances to its credit. Thus, for one thing, it was the first small engine to pass the Air Ministry type tests, which are of a very searching character. Also, fitted in a racing car on Brooklands race track, the "Cherub" engine had a gruelling test in the 200 miles (320 km.) race, when it was kept running at full power for three hours. In connection with the type tests, it should be pointed out that during these the "Cherub" completed a 50 hours' non-stop run at 90 per cent. of the full power. Few large aero engines, and certainly no engine of such low power, have ever accomplished a similar performance, which is one of which the Bristol Aeroplane Co. may justly be proud. The new "Cherub" has not, as far as we are aware, been put through such strenuous officially observed tests, but there is little doubt that the new "Cherub" will worthily uphold the Bristol reputation. It is expected that the new engine will be seen in several of the two-seater light 'planes being entered for the September competitions at Lympne.

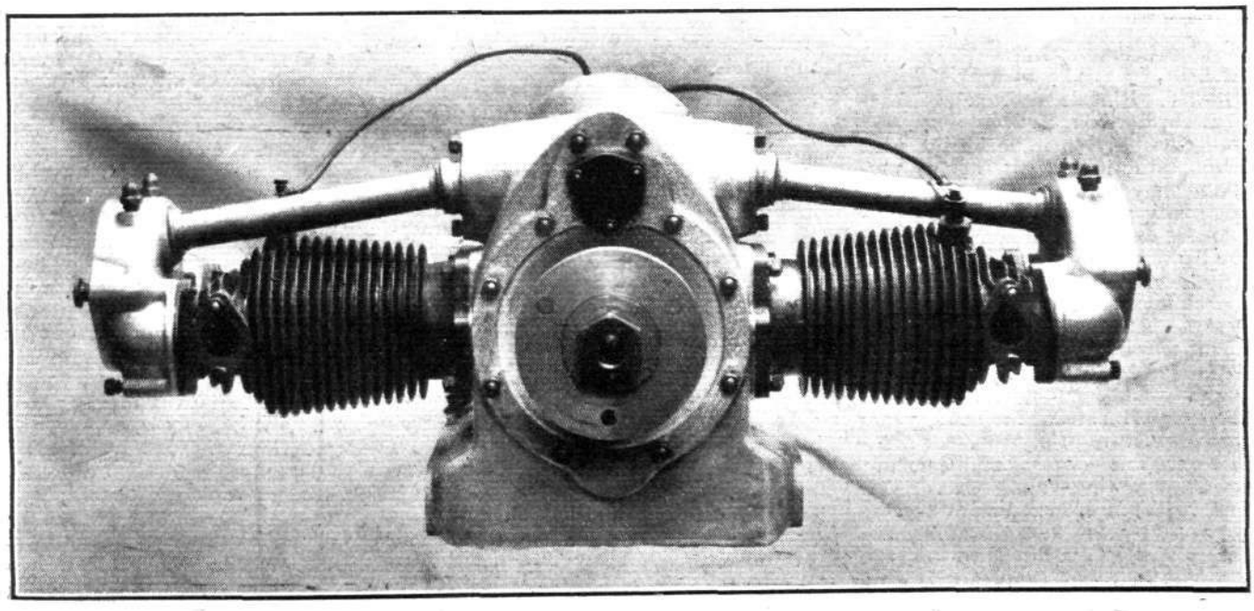
In addition to the direct-drive model, the Bristol Aeroplane Company are marketing a geared type in which the propeller is driven at half the engine speed. This engine is slightly heavier than the ungeared model, weighing 105 lbs. (47·7 kgs.). In certain machines, however, where it is desired to have very good propeller efficiency, it may be worth while fitting the slightly heavier geared model.

A feature not usually found on aeroplanes has been incorporated in the Bristol "Cherub." This is in the form of an impulse starter, by means of which the pilot will be able to start his machine without requiring outside assistance.

THE COVENTRY VICTOR "GNAT."

BELOW we give a photograph of the Coventry Victor "Gnat" light 'plane engine. We have been unable to obtain from the makers any data relating to this engine, beyond the fact that it is stated to be rated at 10-38 h.p. This would appear to indicate that the horse-power, according to the R.A.C. rating, is 10 h.p., while the engine actually develops 38 b.h.p.

It will be seen that overhead valves are employed, and that the valve gear is of somewhat unusual type, or, at any rate, the cages surrounding the valve gear. The engine looks very neat, and is stated to be of very simple construction capable of hard work for long periods. Further information will be awaited with interest.



The Coventry-Victor "Gnat" light 'plane engine.

BRITISH AERONAUTICAL ACCESSORIES

Accles and Pollock, Ltd.,
Oldbury, Birmingham.

COLD-DRAWN weldless steel tubing suitable for the aircraft industry has received for many years much interest and attention on the part of Messrs. Accles and Pollock, Ltd., of Birmingham. At the present moment they are supplying all the important aircraft manufacturers both in Great Britain and abroad, for they hold a reputation of being able to supply just what tubing may be required according to the various conditions and the different Government specifications. They are in a position to meet the demands for tubing of varying sizes, gauges and shapes—the range of sizes running from needle-thickness to about 4 ins. diameter, and the shapes, in addition to the standard round sections, include oval, streamline, cowl-ring, square, rectangular, and many other special designs made to meet the demands of the aircraft industry. They are constantly manufacturing tubing to British Government specifications T.1, T.2, T.5, T.6, T.21 and T.26, and are therefore able to supply any special quality of weldless steel tubing that may be required for the aircraft industry.

In the manipulating of tubing Messrs. Accles and Pollock claim to have had more experience than any other manufacturers and manipulators of weldless steel tubing. For those manufacturers who are interested in the purchase of built-up components, ready for wiring and covering, this firm are in a position to manufacture such articles as rudders, elevators, tail planes, fins and structural components such as engine plates, passenger seats, built-up exhaust manifolds, etc., according to various designs. In the building up of many of these components the use of steel pressings or drop stampings is combined, and the operations of welding, brazing and soldering are embodied. Such articles and operations are manufactured and performed in the firm's own factory, and consequently under personal supervision. A catalogue of special sections of steel tubing, containing over 450 illustrations of various shapes will be sent to all who are interested in this subject, upon applying to Messrs. Accles and Pollock, at Birmingham.

The Aeronautical and Panel Plywood Co., Ltd.,
218-226, Kingsland Road, Shoreditch, London, E. 2.

FEW items play so important a part in the construction of aircraft as plywood, and we venture to state that there are not many aeroplanes in which plywood is not employed in some capacity or the other. As regards plywood specially prepared for use in aircraft, what is claimed to be one of the finest in the world is that known as "Mallite," manufactured by the Aeronautical and Panel Plywood Co., Ltd., of 218-226, Kingsland Road, London, E.2. This firm has been experimenting for some years in the manufacture of plywood for aeronautical purposes—where conditions are somewhat exacting—and that their efforts have been crowned with success is borne out by the fact that they are now supplying "Mallite" to all the leading aeroplane and seaplane builders of Great Britain, and most parts of the world.

"Mallite" is manufactured in accordance with the British Engineering Standards Association Specification 2 V. 3, which as all builders know is very severe. It is made in any size and in any thickness from 0·8 mm. upwards. The 0·8 mm. "Mallite" is in weight only 1¾ ozs. per sq. ft. 1 in. and 1¼ in. is found very fine for engine bearers, and the thicknesses which are mostly used for fuselage work are ⅛ in., 5/16 in. and ¼ in.

Anglo-American Oil Co., Ltd.,
Queen Anne's Gate, London, S.W. 1.

THE Anglo-American Oil Co. are the distributors in the United Kingdom of Pratts' aviation spirit and motor spirit; also the 1-gallon and 5-gallon Pratts' "golden" pumps. The Pratts' "golden" pump, familiar to all motorists throughout the United Kingdom, is also installed at the London Terminal Aerodrome at Waddon, and a unique feature is that the spirit, after passing through the pump, is propelled through some 250 ft. of supply pipe underground to the required filling point, where it is discharged into the aeroplane tank. The arrangement is such that the details when not in use are stored underground, leaving no projection on the surface of the aerodrome. Thus speedy supply is coupled with absolute safety to aeroplanes leaving or arriving.

Auster, Ltd.,
133, Long Acre, London, W.C.2, and Birmingham.

THE name of Auster has been famous for a great many years now in connection with motor-car wind shields. Naturally, when the aeroplane came into existence, Austers turned their attention to the fitting of wind-shields to this new class of vehicle, with the result that Auster Aero wind-shields soon became as popular as the motor-car variety. Auster wind-shields are fitted with Triplex non-splinterable glass, or non-flam material, according to requirements. As regards the various types of Auster wind-shields produced by this firm, inasmuch as these are, generally speaking, made to "suit the machine," it is obvious that there are a great variety of types, and it would be impossible for us to describe all these here. However, there are several standard patterns available, both of the adjustable and non-adjustable types, suitable for well-known makes of aircraft. Austers will be pleased to submit drawings and quote against specification for windshields for all types of commercial aircraft, etc. They have also turned their attention to cabin windows for aircraft, in which they have displayed no small amount of ingenuity.

The British Aluminium Co., Ltd.,
109, Queen Victoria Street, London.

IT is perhaps hardly necessary for us to state that aluminium is universally employed in one way or another in the construction of aircraft—sometimes to a very large extent. The British Aluminium Co. are specialists in aluminium aud its alloys, and are in a position to supply the same in all forms—especially in cases where it is required for aeronautical purposes.

British Celanese, Ltd.,
8, Waterloo Place, London, S.W.1

THIS firm came into being in connection with the Great War, when the supply of cellulose used for aeroplane dope which came from Germany, was naturally stopped. With the assistance of two experts in the production of cellulose acetate—Dr. C. Dreyfus and Dr. H. Dreyfus—the new company was formed, and under their direction cellulose acetate, and its various solvents, was soon produced in large quantities. When the enormous demand for dope fell off with the close of hostilities, the firm's scientific knowledge was turned to putting the various properties of cellulose to other uses. This resulted in the production of a wonderful artificial silk ("Celanese") and a form of celluloid ("Celastoid") possessing all the properties of celluloid, but being non-inflammable. These two "raw materials" can, of course, be put to a great many uses—far too numerous to mention here—in connection with aircraft and motor-cars. All this is, of course, in addition to aeroplane dope.

The British Oxygen Co., Ltd.,
Angel Road, London, N. 18.

Now that the all-metal machine is emerging from the experimental stage, welding forms an important item in the construction of aircraft. Oxygen, of course, is employed very largely for welding plants, and the above firm specialise not only in the production and supply of oxygen and hydrogen, but also in other matters relating to welding plants.

The British Petroleum Co., Ltd.,
22, Fenchurch Street, London, E.C.3.

"B.P." AVIATION spirit forms the main contribution to the aviation industry from the British Petroleum Co., Ltd. They also specialise in underground systems of fuel storage—many of which plants are in successful operation, notably at Croydon Aerodrome.

The British Thomson-Houston Co., Ltd.,
Rugby.

ALTHOUGH, comparatively speaking, a newcomer in the aviation industry, for albeit being an old-established electrical firm, they first started manufacturing magnetos for aircraft engines in the early days of the Great War, the British Thomson-Houston Co., of Rugby, today stand in the foremost rank as regards magnetos—not only for aircraft, but for all classes of internal-combustion engines. They have gained this position, perhaps, owing to the fact that a considerable amount of research work had necessarily to be carried out during the early days of the war in order to produce satisfactory magnetos—much of the material and parts of which had previously come from abroad. However, they not only succeeded in overcoming the problems which arose, but later evolved original types of magnetos that have, as we have indicated above, taken a position in the foremost rank of the magnetos of the world. For aircraft engines the B.T.H. Co. make magnetos of the Polar Induction type, in which magnetic inductors revolve with the main driving spindle, the wound armature and condenser being stationary. They are made for

eight, nine, twelve or fourteen-cylinder engines, and are provided with spark gap distributors and rotary safety gaps. It may be mentioned that the advantage of this type of magneto is that the current generated reaches a maximum value four times during each complete revolution of the polar inductor, thus producing four sparks per revolution of the armature shaft. In conclusion, it may be mentioned that B.T.H. magnetos, besides figuring in most of the big aviation events during the past few years, were used on the aeroplanes securing first and second places in the each of Aerial Derbys (five in all) flown round London during the last five years, and were also fitted to the first two machines in last year's Circuit of Britain race for the King's Cup.

Brown Bros., Ltd.,
Great Eastern Street, London, E.C. 2.

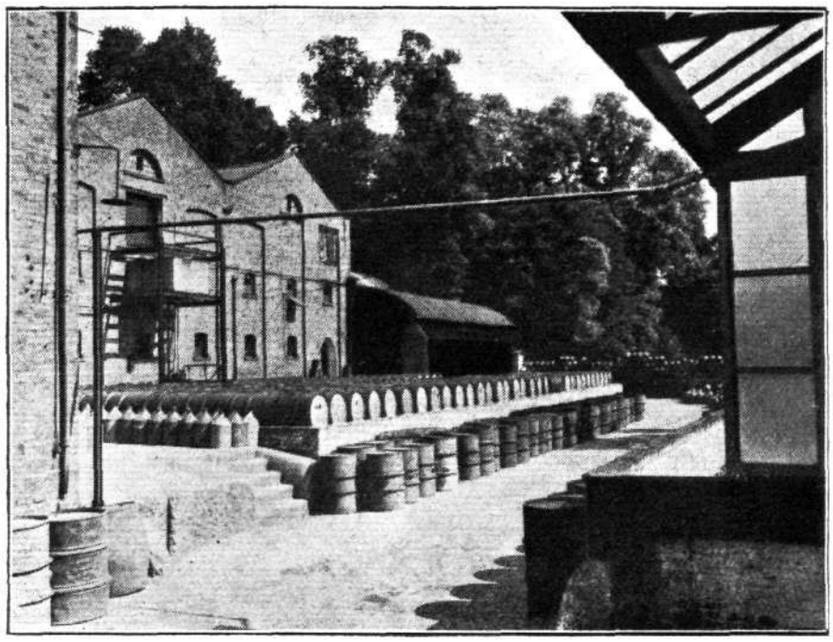
BROWN BROS., LTD., are one of the oldest "accessory" firms in Great Britain, firstly in connection with cycle, motor-car, and then in aircraft work. They are also one of the largest suppliers of aircraft parts to practically all British manufacturers, and also have a large export connection. It is only when one looks through their special aircraft catalogue that an idea of the extensive range of aircraft material handled by this firm makes itself apparent. For instance, this catalogue of some 96 pages, in addition to covering various standard aircraft fittings and materials, instruments, tools and aerodrome equipment, bomb-gear, etc., contains numerous useful British Standard and Air Board specifications. Besides specialising in all A.G.S. parts, Brown Bros. are also in a position to supply presswork and metal fittings and machine parts in special steel to specification.

Bullivants, Ltd.,
72, Mark Lane, London, E.C.3.

WELL-KNOWN as specialists in stranded steel wires and cables, Messrs. Bullivants are also pioneers in the application of the above in connection with aircraft, in which respect they have carried out a considerable amount of research work with a view to producing stranded cables to meet the various requirements for aircraft.

Cellon (Richmond), Ltd.,
Richmond, Surrey.

WHEN the first "Cellon" dope was manufactured in a small factory at Clapham, London, in 1911, the demand, although, of course, not very large in those days, very soon exceeded the supply. This resulted in arrangements being made for the production of "Cellon" in larger quantities by Messrs. Thomas Tyrer and Co., chemical manufacturers, at Stratford. From this time "Cellon" made great strides forward, and "Doped with Cellon" began to be phrase known near and far. By 1913 Cellon, Ltd., was formed, and still supply and demand increased, necessitating enlargements of plant. The Great War, of course, made great demands for "Cellon," not only on the part of Great Britain, but the Allies as well. Thus, in 1916, the present large works, comprising mixing rooms, storage houses, laboratories, etc., were erected at Richmond, and "Cellon" was produced in larger and still larger quantities. In 1918 the present company was formed, and "Cellon" had gained a reputation as satisfactory as it was wide-spread. Naturally, after the Great War the demand for dope was not so large, but fortunately for "Cellon" its fame had spread to foreign countries, and with the resumption of export trade the demand for "Cellon" grew—and still grows.



Part of the Stores Section of the Cellon Works at Richmond.

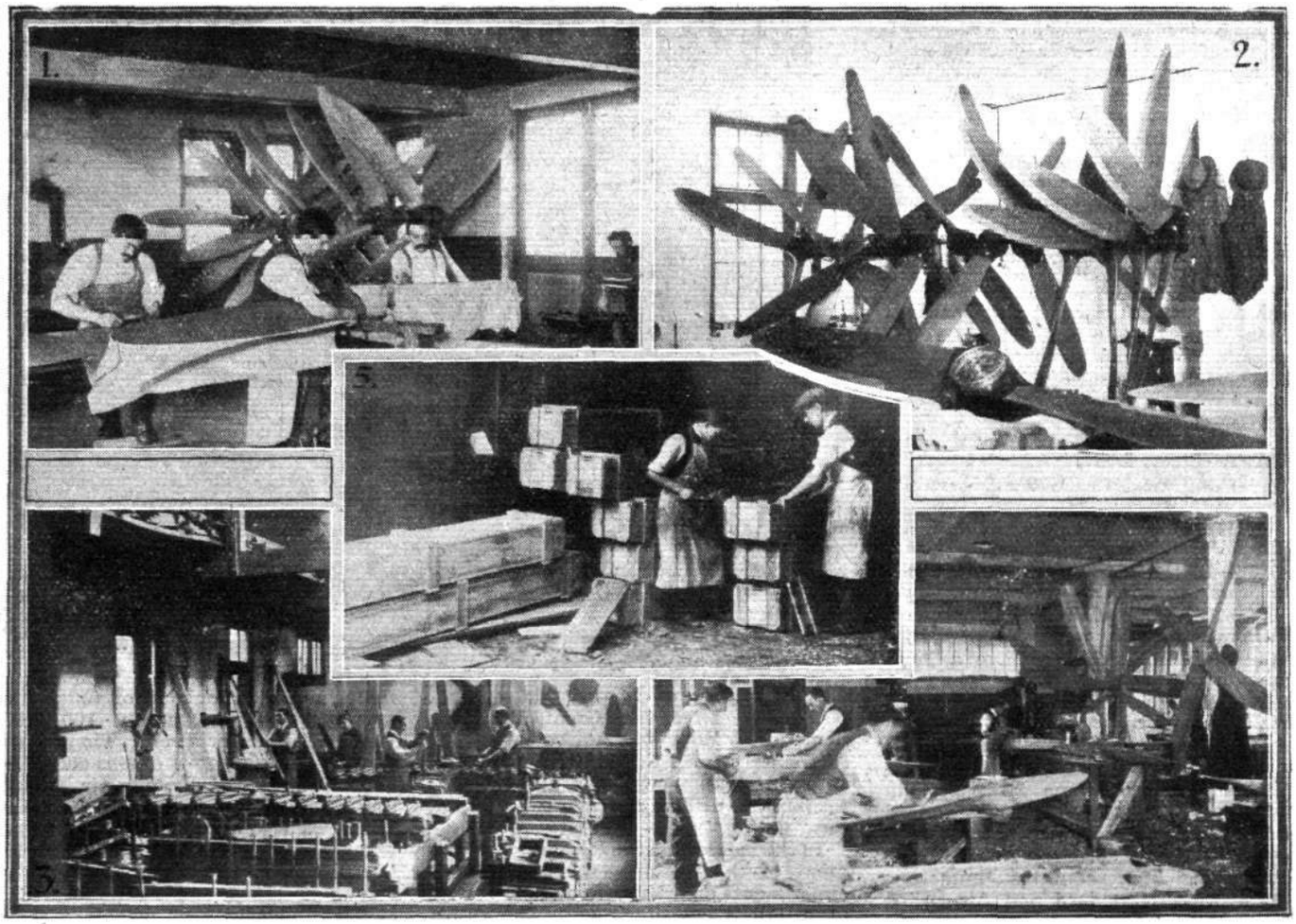
In the meanwhile the Research Department of the works were carrying out experiments on other uses and properties of cellulose solutions, with the result that a number of materials, under the name of "Cerric" have been produced. Chief amongst these are "Cerric" black lacquers, which are made in all grades to give from a dead matt to a highly glossy finish. These, like all other "Cerric" materials, possess the advantage of being rapidly applied by means of spray, and they also dry very rapidly. They are being used very largely in place of the usual stoving enamel. Other "Cerric" materials consist of transparent lacquers, wood solutions, coloured solutions for decorating tins, boxes, furniture, etc. Another speciality from the same source is "Porcelac," white solution which is very largely used for the covering of hospital (or bathroom, etc.) fittings. In conclusion we would point out that "Cellon" and its decendants is represented at the Prague Aero Show, not only on some of the machines there, but at the "Cellon" stand.

The Falcon Airscrew Company,
113, Cottenham Road, Holloway, London, N.19.

THE FALCON AIRSCREW CO., of Holloway, London, are, perhaps, known all the world over as the largest manufacturers of aeroplane and seaplane airscrews. They have always on hand a large number of airscrews suitable for practically all known engines and machines in existence, and are in a position to forward them by aeroplane or steamer ready for immediate flight. This firm has recently been granted the compliment by the British Aeronautical Inspection Department of their own approved inspection. Their resources in timber, which is specially selected for the manufacture of airscrews, are enormous, and their output of finished airscrews is approximately 100–150 of various types per week. They are the largest manufacturers of this component employed by the British Air Ministry, and manufacture the majority of the airscrews used on the British Air Service machines. They also ship to almost every country in Europe batches of airscrews designed and manufactured for the latest designs of machines therein used. One of their specialities is the construction of three-bladed airscrews—a difficult proposition with which they have gained considerable reputation. Another is a system of metal-tipping the blades by means of a series of independent metal "clips," placed one next the other along the edge of the blade, which system is claimed to be a great improvement on the orthodox single metal strip method. A visit to their works, an invitation which is always cordially extended, would impress the representative of any foreign Government with the enormous business this firm does in this particular speciality. They have an excellent system of registration and examination of the various materials used in the construction of airscrews, and there is no firm in Europe with such a capacity for output and first-class workmanship, and we cordially recommend everybody interested in the design and construction of aeroplane airscrews to communicate with them direct.

H. M. Hobson, Ltd.,
27-29, Vauxhall Bridge Road, London, S.W.1.

THE name of Hobson is almost universally known in connection with "Claudel-Hobson" carburettors. We are unable to give a description of the Claudel-Hobson carburettor as such here, for the simple reason that this carburettor is specially designed to embody the particular features desired by any individual engine manufacturer—in other words, it is designed to suit the engine to which it is fitted, and therefore varies in detail accordingly. The Claudel-Hobson carburettor is a standard fitting to many well-known makes of



"FALCON" AIRSCREWS IN THE MAKING: 1, Covering the blades with fabric and affixing metal tips. 2, A corner of the finishing shop. 3, The glueing room. 4, Shaping room. 5, Packing finished airscrews.

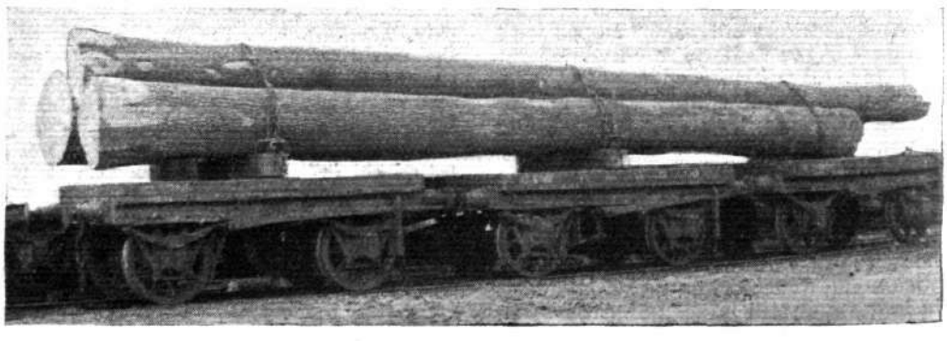
aero engines, amongst which may be mentioned A.B.C., Bristol "Jupiter," "Liberty," Napier "Lion," Rolls-Royce, Siddeley "Puma," Sunbeam, etc. Thus it will be seen that there are Claudel-Hobson carburettors to suit practically every type of aero engine. It only remains for us to add, therefore, that anyone desirous of fitting a carburettor to any particular type of engine should get into communication with Messrs. H. M. Hobson, stating their requirements, and we feel certain that the results obtained will be highly satisfactory.

The London Die-Casting Foundry, Ltd.,
Holloway, London, N. 19.

THIS firm are specialists in the manufacture of die castings in brass, aluminium-bronze and aluminium alloys. In the manufacture of brass die castings they are the pioneers, and stand alone with fifteen years' experience. These brass die castings are mainly used in the electrical industry, the brass used being of high conductivity and of great ductility and strength; they are extensively used for brush holders and switch-gear parts, where they effect great economies by the saving of machining. Aluminium-bronze is a still higher grade alloy as regards strength, and die castings in this material have a beautifully smooth surface. It possesses a tensile strength of 35-40 tons per square inch and upwards. It is superior to manganese and phosphor-bronze as an engineering material. As die casters in aluminium and its various alloys, the London Die-Casting Company were one of the largest producers during the Great War, since when they have continued their manufacture and obtained a high reputation for the most difficult and best quality die castings to Air Ministry requirements for magneto bodies, pistons, carburettor castings, etc. They are stock suppliers of all A.I.D. standard patterns of aluminium strut packing pieces for aircraft.

W. MacGregor Greer.
63, Queen Victoria Street, London, E.C. 4.

THAT the timber used in the construction of aircraft—and this material plays a by no means unimportant part in such work—should be of a very high quality and of particular characteristics, is a fact which hardly requires any emphasis on our part, as this is, or should be, obvious to all connected with the aircraft industry. Suitable and reliable timber for aircraft, however, is not always obtainable from the ordinary sources—unless selected with special care and knowledge—and it is therefore desirable that supplies should be obtained from firms who have specialised in timber as particularly applied to the requirements of aircraft. One such firm is W. MacGregor Greer, a name well-known in connection with English ash logs. These logs are specially selected for their quality, which may be summarised in the following features:—Quick growth; straight clean butts; grain free from knots, curl, black or brown heart; tough and white, and, in fact, suitable for the highest class work. They are sawn into planks of suitable thickness, and the widths vary with the quarter girth of the trees, which are



Fine examples of English ash logs supplied by MacGregor Greer.

mostly 10 ins. to 16 ins. These young trees give the best results, being tougher and whiter than older trees—quite 75 per cent. to 90 per cent. of each plank being usable. They run up to 30 ft. in length. Large stocks of these logs are available, in three stages of manufacture—bone dry ready for immediate use; seasoned; and fresh sawn. All are in log formation, in stick and cleated. Many of the leading aircraft manufacturers in England are using these specially-selected ash planks, and it may be added that a plank by plank selection is allowed.

John Maclennan and Co.,

115, Newgate Street, London, E.C.1.

THE Textile side of aircraft is looked after by this firm, which, established in 1875, has been able to turn its just on 50 years' experience of cotton and the like to good account as far as aircraft are concerned. Here are just a few of the items in Aircraft Smallware handled by this firm :—Egyptian Cotton Tapes, "India" Tapes (American cotton), Linen Tapes (Flax), Cotton Webbing, Flax "Kite" Cord, Balloon Cords, "Flexotube" Insulated Sleeving, Linen Thread, etc., etc.

Marconi's Wireless Telegraph Co., Ltd.,

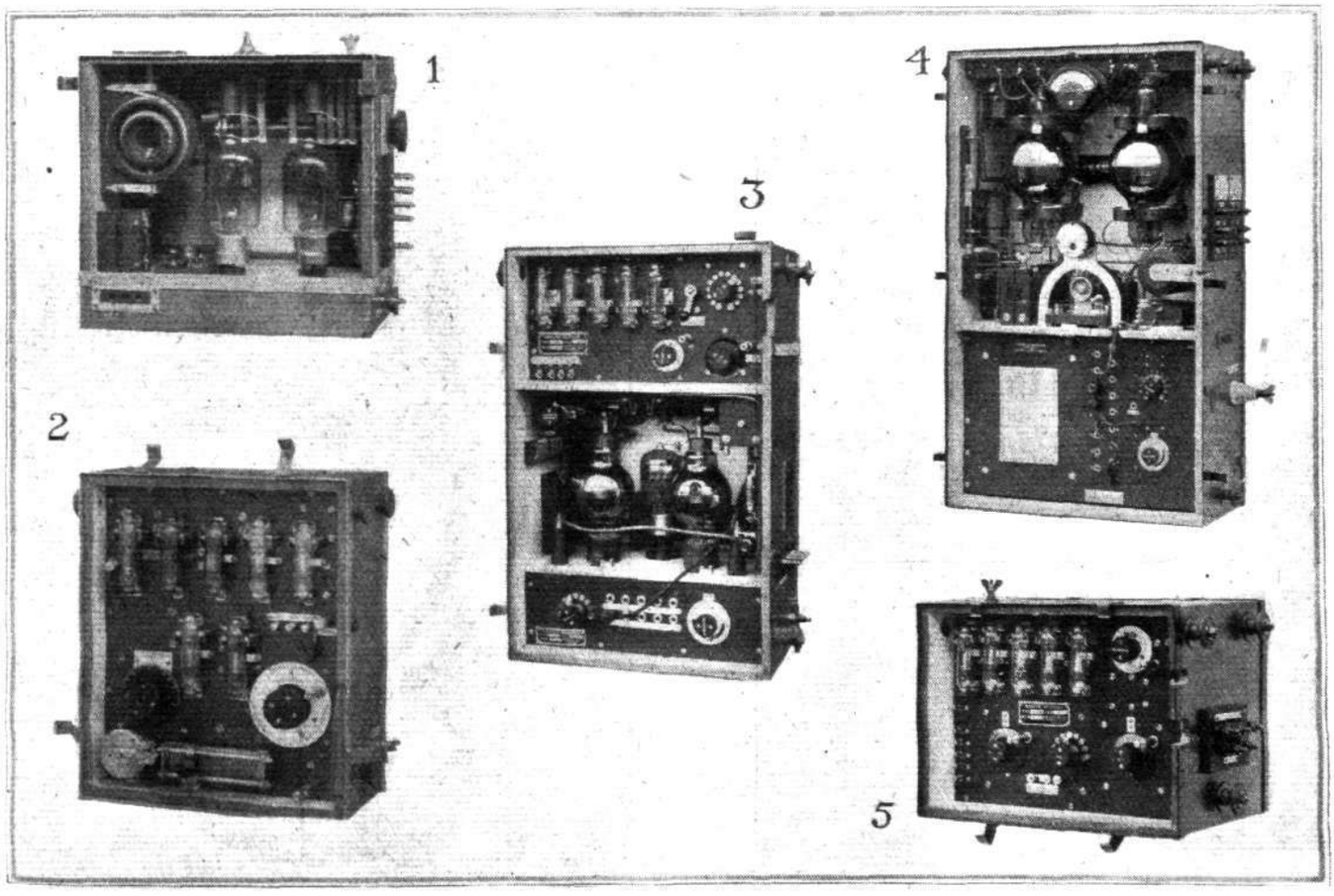
Marconi House, Strand, London, W.C.2.

As long ago as 1912, when flying by aeroplanes was still in its infancy, the Marconi Company turned its serious attention to the problem of developing wireless apparatus suitable for installing in aeroplanes for the purpose of maintaining communication with the aeroplane when in flight.

During the European War, both the art of flying and the art of radio communication developed by leaps and bounds, and wireless telegraph apparatus was extensively used in connection with aircraft throughout the War, and especially during its later stages. After the Armistice, when attention was concentrated on commerical flying, the Marconi Company, realising the enormous importance of wireless communications in connection with such services and the special nature of the requirements, immediately formed a special department for attacking the problem of aircraft communication both for commercial and military purposes. Much valuable research work, leading to the evolution of finished designs, has been

MARCONI AIRCRAFT WIRELESS SETS

Description.	Type.	Power.	Wave-range.	Remarks.	Weight.
Aircraft direction finder set ..	A.D.4 ..	—	600-1,000 m. ..	For installing in large long-distance aircraft.	13·2 kilos.
100 watt inter-aircraft set (short wave)	A.D.5 ..	100 watts	T. 75-125 m. .. R. 75-125 m.	For small fighting machines ..	30·5 kilos.
150 watt "all purpose" aircraft set	A.D.6 ..	150 watts	T. 350-1,200 m. R. 350-1,200 m.	An all-purpose set for naval and military or commercial uses.	42 kilos.
150 watt commercial aircraft set	A.D.6A	150 watts	T 350-1,200 m. .. R. 850-950 m.	For commercial service aircraft, or "fixed wave" services	42 kilos.
0·5 k.w. aircraft set	A.D.8 ..	500 watts	T 600-1,500 m. .. R. 600-4,000 m.	For long distance, bombing and reconnaissance machines.	73 kilos.
150 watt aircraft telegraph set	A.D.9 ..	150 watts	T. 350-1,200 m. R. 350-1,200 m. ..	A.C.W. telegraph set for military and naval services.	—
Aircraft artillery co-operation ground receiving set	A.D.10 ..	—	R. 200-400 m. ..	For gun-ranging in conjunction with the A.D.11 or 11A transmitter	—
Aircraft artillery co-operation set	A.D.11 .. A.D.11A	40 watts .. 100 watts	T. 200-400 m. .. R. 400-1,200 m.	For naval and military gun-ranging	17·2 kilos. 28·6 kilos.
Maintenance engineers' aircraft testing set	—	—	—	For general use at aerodromes ..	—



MARCONI AVIATION WIRELESS SETS : 1, A.D.5 Receiver. 2, A.D.5 Transmitter. 3, A.D.6 Transmitting and Receiving Set. 4, A.D.8 Transmitter. 5, A.D.8 Receiver.

carried out by the experimental section of this department, while the activities of the installation section were concentrated on introducing and organising a wireless service on behalf of the leading aircraft companies flying between Great Britain and the Continent. The result of this work was to develop a system of installation, maintenance, and operation of wireless communication and position finding services on a large scale which has been of incalculable value to the flying industry.

The opportunities for improving and perfecting the apparatus in use, to which such an organisation gave rise, have been taken full advantage of by the Marconi Company, and commercial aircraft sets have been developed and standardised which are clained to be far in advance of any sets produced elsewhere. Several of the engineers devoted to this work were closely associated with aircraft communications during the War, and were, therefore, in a position to combine their first-hand knowledge and experience of military requirements with that gained in connection with commercial aviation. In many respects the problems are identical, and, consequently, much that is done in the development of commercial apparatus has been taken advantage of in the design of military equipments. It is, unfortunately, impossible for us, in the space at present available, to describe the various types of wireless sets produced by the Marconi Company for aircraft use, but we give on p. 343 a schedule of the principal features of the various standard aircraft sets at present listed, and also illustrate some of these sets.

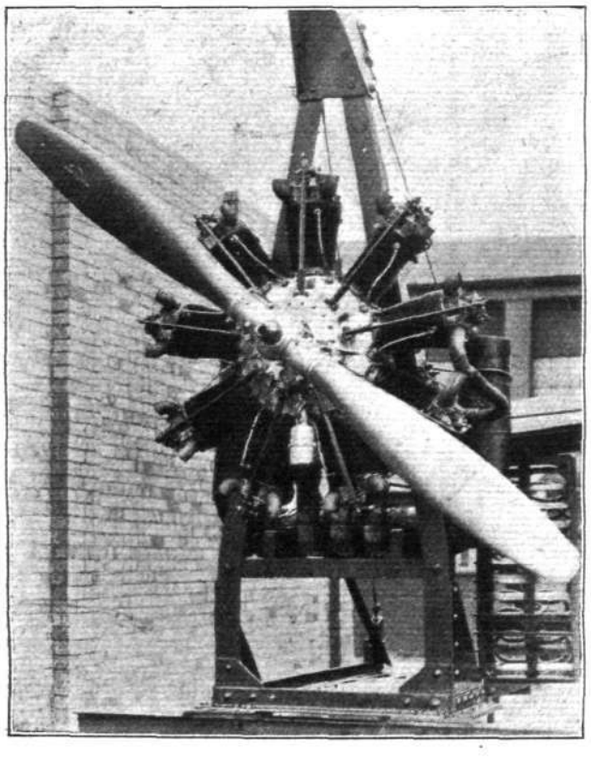
The Metal Airscrew Co., Ltd.,
Regent House, Kingsway, London, W.C.2.

HAVING passed through an arduous period, lasting several years, of research, experiment and close investigation, the metal airscrew is now an established and sound fact—thanks to the efforts of Mr. Henry Leitner and Dr. Watts. Since its formation in 1919, the Metal Airscrew Co. has produced a large number of metal airscrews, system Leitner-Watts, which have already built up a reputation for reliability and safety. It may be of interest to mention that the Farman "Goliath" (two 350 h.p. Renault engines), on which MM. Bossoutrot and Drouhin set up a non-stop duration record of 34 hrs. 14 mins., was fitted with Leitner-Watts metal airscrews. It is impossible for us to describe this airscrew in the space available here, but we may mention some of its definite advantages, as follows :—(1) The blades are detachable ; (2) They are adjustable for pitch ; (3) They can easily be changed or replaced ; (4) They are not affected by climate or temperature ; (5) Nor by rain, hail, snow, sea water or spray ; (6) They do not split or fray ; (7) They are not affected by shocks, and are unburstable ; (8) Are easily handled for transport and easily fitted and adjusted in the field ; (9) They are suitable for all engines and all aircraft. Perhaps the following statement on propellers from a report on the British Aviation Mission in Japan may be of interest in connection with metal airscrews :—

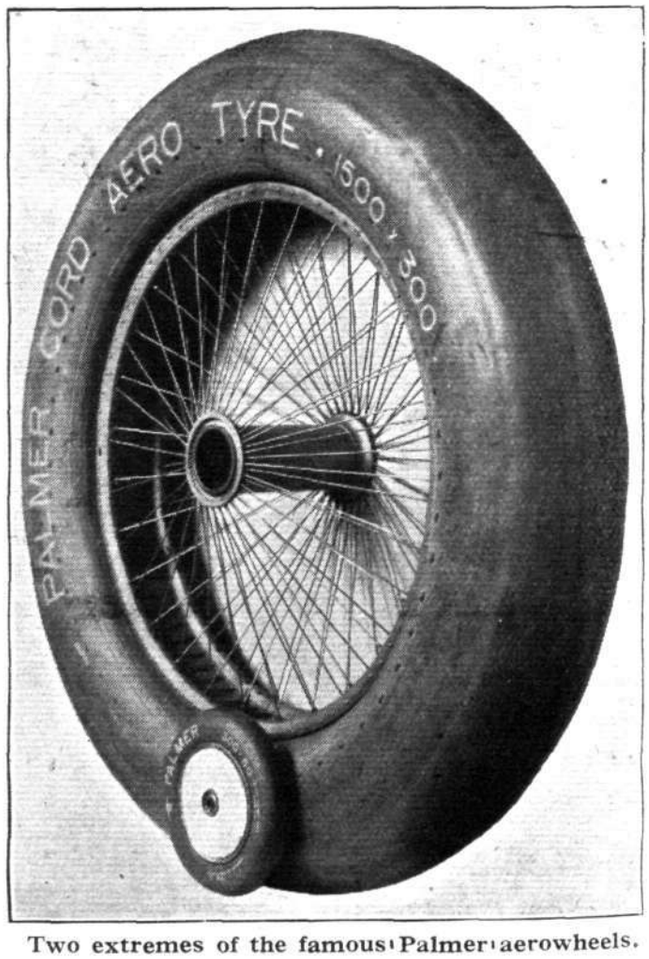
"Wooden propellers, as might be expected, give a good deal of trouble in Japan, particularly in the summer. All the wooden propellers we had in use were manufactured in this country. A number of steel propellers of the Leitner-Watts variety were tried on each type of engine. Some of these were two and others three bladers. Many have been running for a considerable time, and no failures have occurred. There can be no doubt that the metal propeller will come more and more into general use, as its advantages, particularly in the tropics and for seaplanes, transport as spares, etc., are very large. On our principal aerodrome, which is of large area, the grass and vegetation generally grow with such remarkable rapidity in the spring and early summer, that it is almost impossible to cut the whole area rapidly enough. Under these conditions the anxious pupil embarking on his first solo and being told to keep his tail well up, does so with such effect that the grass gets cut by the propeller, with results which are disastrous after an average morning's flying. The wastage of wooden propellers was under these circumstances extraordinarily high. Steel propellers, of course, never suffered and could cut grass with impunity. At the time these propellers were ordered, in the commencement of 1921, they were the only type of metal propeller being manufactured in the world. Since that day, minor improvements in design and methods of manufacture have led to the production of a superior product, particularly as far as interchangeability of blades and weight-saving are concerned."

William Mills, Ltd.,
Grove Street, Birmingham.

THIS well-known firm of Aluminium Founders have gained some considerable reputation in the aircraft industry, more particularly in connection with their success in turning out various intricate castings to the British Air Ministry specifications. It is in this kind of work—all kinds of castings to special requirements—that William Mills Ltd.,



The Leitner-Watts metal airscrew fitted to the 400 h.p. Bristol "Jupiter."



Two extremes of the famous Palmer aerowheels.

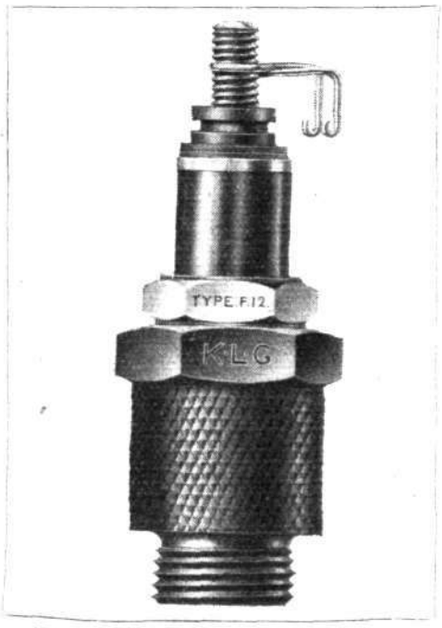
excel, and our readers may be assured that any inquiries of this nature will be met satisfactorily and with promptitude.

Palmer Tyres, Ltd.,
Shaftesbury Avenue, London, W.C.2.

IN spite of the fact that an aeroplane is primarily intended to *fly*, the landing gear is none the less a very important item in its design, for landing and taking off call for more or less exacting requirements. As may be expected, a firm possessing the experience and reputation of many years in connection with tyres and wheels as that enjoyed by Palmer Tyres, Ltd., these components as applied to aircraft have received a considerable amount of attention from this firm. They have, therefore, produced special aero tyres of all sizes to meet all requirements, and these have, as in the case of motor tyres, achieved a world-wide fame, and have figured in many of the big aviation successes. The Palmer Tyre Co.—who, it should be mentioned, are exhibiting a selection of their tyres and wheels at the Prague Aero Show—have not confined their efforts to producing aero tyres alone, but to complete wheels (rims, spokes, hubs, etc.) which possess several distinctive and important features. The famous Palmer aeroplane landing wheels and tyres are manufactured in some eighteen different sizes from 375 × 55 to 1,750 × 300, providing suitable equipment for absolutely every class of 'plane from the lightest gliders to the very heaviest commercial or military machines.

The Robinhood Engineering Works, Ltd.,
Putney Vale, London, S.W. 15.

As far as sparking plugs for aircraft engines are concerned, there are none, we think, so well-known and popular as

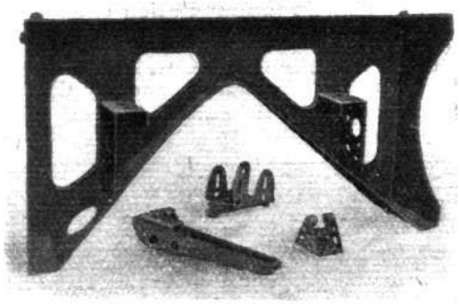


The K.L.G. type F.12 Aviation Plug.

the "K.L.G." plugs. Furthermore, these plugs date back to the comparatively early days of aviation, and even then they were recognised as the only plugs for aeroplane and super-efficient racing engines. Apart from its use during the Great War, when the entire resources of the Robinhood Engineering works were at the disposal of the British Government, the K.L.G. plug has figured in practically all the big aviation events. K.L.G. plugs are a standard fitment in almost every type of aircraft, but in spite of their present undoubted success, the Robinhood Engineering Works are continually carrying on experimental work and producing new and improved models. Perhaps the most interesting of these is the K.L.G. "Miniature" model—which, we would point out, should not be confused with model plugs suitable for use in model engines, for this plug has been produced to meet the requirements of the modern high-efficiency engines in which space in the combustion chamber is very restricted. This "Miniature" plug gives the full advantage to be obtained from a small diameter thread, while retaining an ample length of barrel, no attempt having been made to retain the usual proportions of a sparking plug, as in the small size these necessarily cause great inaccessibility—even if they can be incorporated in an engine design. The K.L.G. type F. 12 plug—which we illustrate herewith—or modifications of it with longer reach, are still the standard for all British aviation engines.

Rubery, Owen and Co.,
Darlaston, Staffs.

THIS is an old-established firm of constructional engineers and manufacturers, who have specialised in pressed-steel work. For some years past they have also given considerable attention to the requirements of aircraft in connection with metal work, and are in a position to supply a full range of standard aircraft fittings, such as A.G.S. turn buckles, eye-bolts, bolts and nuts, etc. They are also prepared to supply components or complete units in metal, such as spars, ribs, struts, engine bearers, etc., to customer's designs or specifications It may be of interest to note that they



An example of the Rubery, Owen pressed steel work.

manufacture for the Metal Airscrew Co. the Leitner-Watts all-steel air screw. They are also the sole manufacturers of Fox's Patent Wire-bending Pliers, and the "R.O." Starting Release Gear for aircraft.

Shell-Mex, Ltd.,
Kingsway, London, W.C. 2.

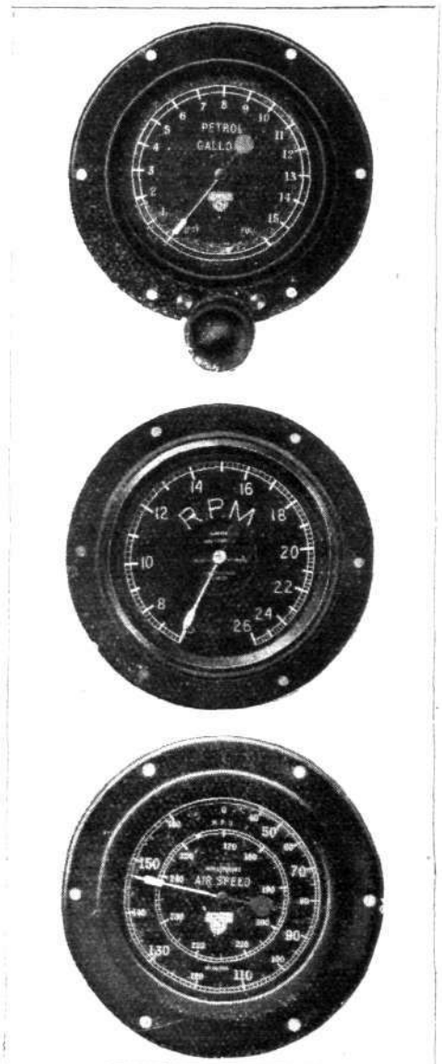
IT is only necessary to bear in mind that nearly every big aviation event—records, races and long-distance flights—that has taken place since the early days of flying has employed "Shell" as the means to the end, and one will realise that in the various brands of Shell spirit we have real essence of efficiency and reliability. We need hardly say more on "Shell" aviation spirit, except that, like the other much-advertised spirit, it is "still going strong."

Short and Mason, Ltd.,
Walthamstow, London, E. 17.

WITH more than 60 years' experience of instrument making to assist them, it is only natural that Messrs. Short and Mason have achieved success in the production of instruments for aviation purposes. All the various types—altimeters, height recorders, etc., etc.—are manufactured by them.

S. Smith and Sons (M.A.), Ltd.,
Cricklewood, London, N.W. 2.

A FULL range of "Smith" Aircraft Accessories—including air speed indicators, rev. counters, petrol gauges, oil and fuel pressure gauges, altimeters, oil and water transmitting thermometers, chronometers, compasses, navigating instruments, etc., and also K.L.G. sparking plugs (for which S. Smith and Sons are the sole export distributors for the entire world)—are exhibited at the Prague Aero Show. They will also be discovered modestly hiding themselves away on the British machines at this show—and probably on many of the other machines as well. Smith's Aircraft Accessories, certainly need no introduction from us, for their reputation of many years' standing is not confined to British aviation alone, but also flourishes in every country in the world in which aircraft exists. There is hardly a big aviation event—record or racing—in which the name of Smith has



Three "Smith" Aero Instruments: A petrol level indicator, rev. counter, and air speed indicator.

not been associated. S. Smith and Sons, it may be added, are not content with resting on their laurels, but are continually at work experimenting and perfecting their instruments, for which purpose they have a magnificently equipped research department at their very extensive works at Cricklewood. As a result they are in a position to supply every type of instrument for both experimental and general purposes, for in addition to ordinary standard instruments, Smith's also produce special apparatus for testing and calibrating instruments.

Titanine, Ltd.,
175, Piccadilly, London, W. 1.

MESSRS. TITANINE, LTD., are manufacturers of aeroplane dope and varnishes and paints for aircraft of all descriptions. Titanine products are largely used in the most important aviation centres of the world, including many of the principal governments, among which may be named Great Britain and the United States. In Great Britain their products are being used on the majority of aircraft building. The doping scheme which is attracting particular interest at the moment is known as T.2.S., consisting of four coats of a red pigmented dope known as Titanine Two, which excludes the injurious ultra-violet rays of the sun from the fabric, thus preventing injury; following the red dope a covering of aluminium nitro varnish is applied which acts as a "reflector," keeping the planes cool. Among the company's products may be named dopes and varnishes of all descriptions and to suit all climates, paints for duralumin and bright metal parts, hulls of flying-boats, seaplane floats and ply wood. Also Titanine white dope resisting paint for application before covering to wood and metal skeleton parts. Titanine is produced at two factories, one at Hendon, London, N.W., and one at Union, Union County, New Jersey, U.S.A.

Vickers, Ltd.,
Vickers House, Westminster,
London, S.W. 1.

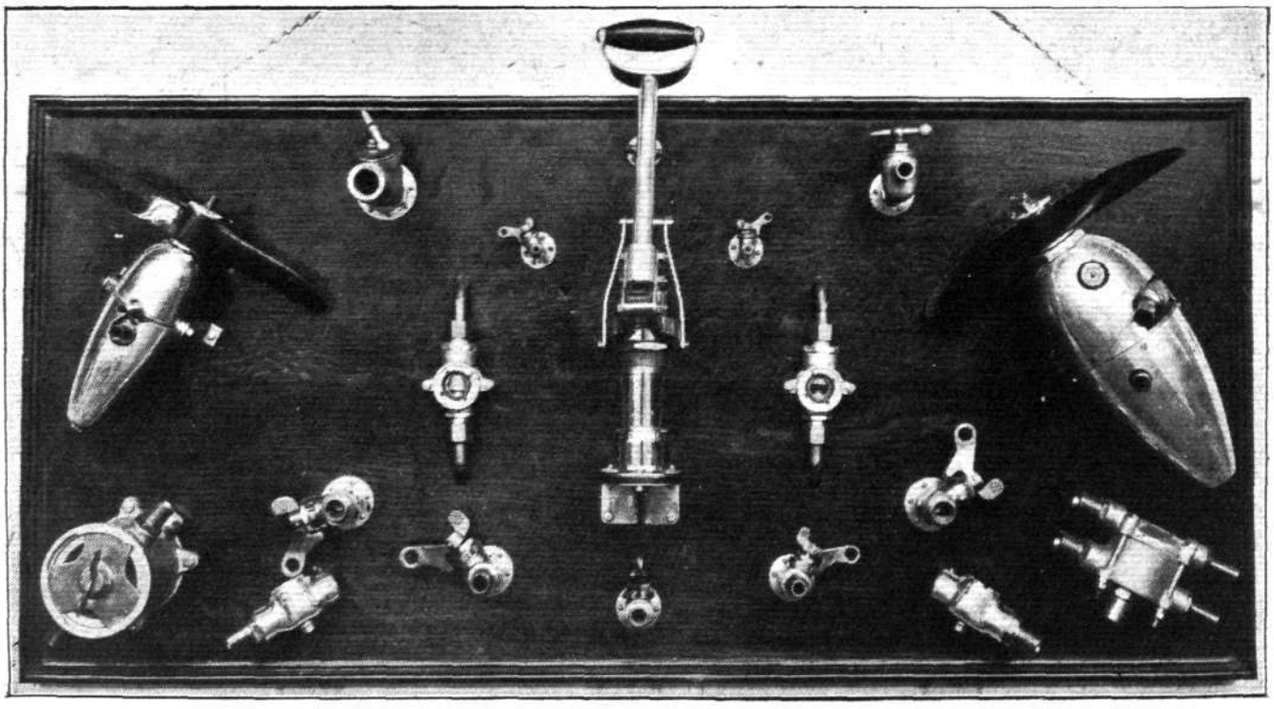
The makers of the world-famous "Vickers" aeroplanes do not confine their activities to the production of the complete machine itself, but also to its components and accessories. In the first place, one of their most important "side lines" comprise the production of raw material for aircraft in the form of special steels and the well-known aluminium alloy "Duralumin." Secondly, there are aircraft accessories, in which they have specialised particularly in the all-important matter of the petrol system as a whole. In this connection they have evolved fittings and components, such as pumps, relief and by-pass valves, cocks, etc., which in addition to being highly efficient in themselves, have resulted in some considerable improvement in the petrol system generally. One important Vickers aircraft component is their Oleo-Pneumatic undercarriage, which employs compressed air as the resilient medium in place of the usual rubber cord. The compressed air is imprisoned in a steel cylinder and the moving piston or supporting ram operates through an oil-sealed gland; the oil not only acts as the internal hydraulic shock damper, but also serves to lubricate the few moving parts of the complete gear. The Reid Control Indicator is another Vickers flight accessory, while the Davis Navigation Lights for aircraft—including a comprehensive range of head, tail, port and starboard, etc., lamps—form but one of many other Vickers aircraft components.

The Victoria Rubber Co., Ltd.,
Edinburgh.

THIS is an old-established aircraft firm, manufacturing fabrics for use in connection with aviation, especially rubber-proofed for airships and balloons. Beyond this, there is, we are afraid, little else for us to say as regards this firm, except that their materials have enjoyed a tip-top reputation extending over very many years.

C. C. Wakefield and Co., Ltd.,
30-32, Cheapside, London, E.C.2.

WE venture to state that there will be few of our readers who are not cognisant of the world-wide fame achieved by Messrs. C. C. Wakefield with their "Castrol" lubricating oils—which, by the way, are one of the "exhibits" at the Prague Aero Show. There are, however, we think, not so many who know what the qualities and characteristics of Castrol are—or, in other words, the secret of its success. Years ago pure castor oil was employed in high-powered internal combustion engines—especially in France—with a certain amount of success as compared with ordinary mineral oils. It possessed, however, certain disadvantages, such as gumminess, acidity, and a tendency to deposit a glue-like substance which rendered it objectionable as a general lubricant. It showed, however, a decided superiority over all other oils, one being that it alone was capable of withstanding very high pressures. It has a far greater resisting power than any other fatty oils or the most viscous mineral oils, while it furthermore gives the thickest oil film, and therefore has the best cushioning effect when certain pressures are exerted—as, for instance, in the case of a big-end bearing. To retain in a lubricant the acknowledged virtures of castor oil without its defects was a problem C. C. Wakefield and Co. set out to solve, which, after much research work, they succeeded in doing by blending a castor oil of great purity with a special grade of mineral oil—a great achievement when it is pointed out that normally castor oil will not mix with a mineral oil. The production and use of "Castrol" has thus revolutionised the art of lubrication as applied to internal combustion engines. The elimination of the disadvantages of pure castor oil is shown in the considerably greater speed and enduring power which the increased friction-reducing capacity of "Castrol" oils produces—advantages which are so strikingly illustrated by the fact that "Castrol" is employed almost generally by the motor racing fraternity, whether on car, aeroplane, motor-cycle or motor boat.



Some of the Vickers patent petrol accessories and fittings.

FLIGHT
AIRCRAFT ENGINEER

PROGRESS IN THE BIG FLIGHTS

ROUND-THE-WORLD FLIGHTS

PROGRESS in the round-the-world flights during the past week has not been very great. In the first place, Squadron-Leader MacLaren had only added another 350 miles to his credit when he once again met with misfortune. This time his mishap was of a more serious nature, resulting in the complete disablement of the machine, but fortunately without hurt to himself or crew.

Secondly, the three American pilots—Lieuts. Smith, Wade and Nelson—having completed, in two stages, the 900 miles to Tokio, are now resting and having their Douglas biplanes overhauled and having new "Liberty" engines installed. They are, therefore, likely to remain in Tokio for some time.

Having had the new (low-compression) Napier "Lion" engine installed in the Vickers "Vulture" amphibian, Squadron-Leader MacLaren and crew left Calcutta very early in the morning on Wednesday, May 21, and after flying for four hours, during which they encountered several heavy rainstorms, landed on the golf course at Akyab, 350 miles from Calcutta.

It was originally intended to leave Akyab for Rangoon on the following morning, but owing to terrific cyclonic weather conditions the flight had to be postponed. On Saturday, May 24, they started off, but they had not been in the air more than five minutes when the machine crashed into the harbour. The "Vulture" was badly smashed, but MacLaren and his companions escaped uninjured. It is of interest to note that it was not far from this spot—at Chittagong, 170 miles to the north—that Capt. MacMillan and Capt. Malins came to grief during their world flight attempt in 1922.

There is a possibility that Squadron-Leader MacLaren will be able to resume the flight, for it is reported that an offer has been made for the transport, on U.S. destroyers now in the Far East in connection with the American flight, of the spare machine at Tokio. This is an extremely sporting offer on the part of the Americans—who are, in a way, rivals in the world flight—and one that is much appreciated and which would considerably help matters.

Last week we left the American team at Yetorofu (North Japan), where they arrived, in bad weather, on May 19. They were held up here by stormy weather for two days. However, on May 22 (Thursday) they left Yetorofu at 5.30 a.m., and after passing over Kushiro landed at Minato at 10.40 a.m. After a stop here of nearly two hours, they resumed their journey, and arrived at Kasumigaura naval aerodrome (just outside Tokio) at 5.40 p.m.

PARIS-TOKIO FLIGHT

LIEUT. PELLETIER D'OISY, who came to grief in a bunker at the thirteenth hole on the Shanghai golf course, on May 20, will not be prevented from resuming his journey to Tokio for the lack of a machine, for he has received several offers of a new mount from several quarters. Besides the French Military Breguet at Hanoi, which the French authorities ordered to be sent to him at Shanghai, the British authorities at Hong Kong offered to send a new machine for d'Oisy to fly. The French Department of Military Aeronautics also endeavoured to make arrangements for the securing of one of four Breguet machines purchased some time back by the Chinese Government, and which are stationed at an aerodrome some 60 miles from Shanghai. Another offer, made by Lu Yung-kyang, Governor of Chekiang, of a Breguet (also fitted with a Lorraine-Dietrich engine) has been accepted by Lieut. d'Oisy, who is making arrangements for an early get-away. This machine has not the fuel capacity possessed by his former machine, and so the rest of the journey will have to be made in much shorter stages.

Officially, Lieut. d'Oisy's flight is regarded as having ended at Shanghai—sufficient and satisfactory proof having, up to that point, been given as to the possibility of flying from Europe to the Far East in a single machine carrying its own spares. Lieut. d'Oisy, however, is being given every facility officially, for continuing his journey.

Lisbon-Macao Flight.

THE Portuguese aviators, Capt. Brito Paia and Lieut Sarmento, have purchased from the R.A.F. in India a "D.H. 9" machine to replace the Breguet, which crashed at Pipar on May 7. They have been carrying out test flights on this machine, and will resume their journey to Macao without delay.

"THE FLIGHT ROUND AUSTRALIA"

THE DISTANCE FROM LONDON TO ANY OF THE CITIES SHOWN ON THIS MAP IS NOT GREATER THAN THAT OF THE FLIGHT ROUND AUSTRALIA (8500 MILES) RECENTLY MADE ON A FAIREY III.D. SEAPLANE WITH A ROLLS-ROYCE "EAGLE" ENGINE

FROM the annexed map of the Great 8,500 miles Flight round Australia, the distance travelled in the time, 90 hours, by Wing-Commander Goble and Flying Officer McIntyre on the trusty Fairey machine, equipped with one of the wonderful Rolls-Royce engines, may be appreciated by comparison with other well-known world centres shown on the sketch map. Not only has the Rolls-Royce-Fairey machine in this unprecedented flight stood up to its prodigious mileage, but from a cablegram just received from Messrs. Goble and McIntyre it would appear that it could "carry on" for another jaunt round Australia if necessity arose. The message reads: "Thanks cablegram. Despite age of machine and long exposure rain, sun and tropics, performance Fairey alway excellent. Seaplane quite fit for any further service."

We feel sure Lieut. d'Oisy will be proud to add *his* congratulations to those of the thousands who have already expressed their admiration of this great performance.

IN PARLIAMENT

THE GOVERNMENT AIRSHIP POLICY

IN the House of Lords on May 21 Lord Thomson, Secretary of State for Air, in reply to Lord Gorell, who asked the Government whether they were in a position to make a statement as to their airship policy and moved for Papers, said that in the first place he would repeat the assurance of the Prime Minister in the House of Commons last week that His Majesty's Government recognised fully the necessity on Imperial, commercial, naval, and military grounds for proceeding with the development of lighter-than-air vessels. As a nation we could not lag behind either France or the United States in this respect; in fact, our need was greater than that of any other country. An improvement of Imperial communications which would bring India within seven days and Australia within 14 days of our shores was obviously a matter of extreme importance. If airships could be operated in all climates, and under even adverse weather conditions, there would not only be a great commercial future for them, but by their means it might be possible to effect considerable economies in the naval and air estimates. The late Government had decided to develop airship construction by private enterprise, and negotiations with that end in view had been carried to an advanced stage with Commander Burney, who had put forward what was called the Burney Scheme. One of the first things which he did when he became Secretary of State for Air was to investigate the Burney Scheme. A Sub-Committee of the Cabinet was set up whose conclusions formed the basis of the statement which he was making to their lordships that day. Lord Thomson went on to give an outline of the Burney scheme, and, proceeding, he said that for a period of at least seven years, which might have been extended to eight, because he questioned whether the first ship would have been built within 12 months, £2,800,000 was to be paid under the Burney Scheme in subsidies. For that sum six airships were to be constructed—say, for the purposes of calculation, £350,000 a ship, leaving £700,000 for ground facilities, sheds, mooring masts, etc. According to his advisers, £350,000 was a fair price for the first ship, but in the case of subsequent ships many of the same materials, the same sheds, gas plant, and so on might be used, and, in view of that, £350,000 seemed a rather excessive price. Moreover, these ships, under the Burney Scheme, remained the property of the company that built them. Further, than that the company had a free lease of the valuable properties at Cardington and Pulham, which were perhaps the finest properties of their kind in the world. For a subsequent period of eight years, £2,000,000 was to be paid in fees. For that sum six airships would be operated on the Indian route, but those ships would only be available for other purposes in return for special charter rates.

During the whole currency of the agreement—namely, 15 years—a total sum was to be payable from public funds of £4,800,000, to which must be added the value of the properties at Cardington and Pulham, as well as the airships, machinery, and plant at those stations. A conservative estimate of their total value would be £500,000, which was the sum mentioned in the agreement, the option price. It was proposed, under the Burney Scheme, that half the net profits of the company each year should be set aside for the purpose of repayment of the subsidies, and security was provided in the shape of debentures not bearing interest. It had been calculated that at least 60 years would be required with profits averaging 20 per cent. per annum before the total amount of £3,300,000 would be repaid.

At the end of the 15 years' period the company would have a virtual monopoly in view of the immense sums of public money with which it had been endowed, and its possession of the unique stations at Cardington and Pulham. As he saw it, the company would have become, under the original agreement, almost a State Department—disposing of these enormous sums merely on the fulfilment of certain not very onerous conditions. Proceeding, Lord Thomson said the group would have become the one and only airship provider in the country, and, provided conditions were fulfilled, would have enjoyed complete freedom with regard to contracts with other Powers and a most enviable independence of Treasury control. It would have had money and time enough to disregard all rivals in the commercial world and fix its own prices. In practice control by the Government would merely have extended to insisting on certain results being forthcoming at the end of three years. Once committed to an enterprise of this nature, it would have been very difficult for any Government to extricate itself.

Another objection to the scheme was that expert opinion in the Air Ministry was not satisfied with certain technical matters at the stage the negotiations had reached when the present Government came into office. The great technical objection taken was the fact that Commander Burney did not propose to construct what the Air Ministry thought suitable ground facilities in India and at intermediate stages. He had thought of utilising the untried method of mooring masts, which the Air Ministry experts thought would have involved unwarrantable risks.

Justice, however, demanded that he should refer to the advantages of the Burney Scheme. Under its provisions there might have been a fleet of six airships within seven and fourteen years, and the presumption was that a not inconsiderable sum of private money staked in the success of the enterprise might have served as an incentive to energetic effort. The enthusiastic optimism and driving power of Commander Burney had been remarkable. He had kept alive interest in airship development when others doubted, though in his (Lord Thomson's) opinion he took too much for granted.

In this sort of enterprise there was a commercial risk and a technical risk. In regard to the commercial risk, he found a very widespread opinion that until airships had been properly "tried out" and their safety and convenience proved, they were not likely to be of much commercial value. Many of the leading firms likely to be interested in airship construction had for this and other reasons held back. In these circumstances, some form of State assistance was essential to encourage that form of enterprise. In the case of subsidies the sums must be very large both during the constructional stage and the later, in order to induce constructors to start work. If, on the other hand, the work of building the airships were undertaken by the Government, then the Government would have to make itself responsible for the costly and unremunerative stage of experiment and research. When the practicability of airships had been proved there was little doubt in his mind, and in the minds of his advisers, that a number of firms would come forward, and that the industry would be put upon a national and, indeed, an Imperial basis.

Continuing to outline the scheme which the Government proposed to put into effect, Lord Thomson said: In the first place the Air Ministry will proceed with airship research, including flying trials, full-scale trials with one of the existing ships, which will be reconditioned for the purpose. It will also construct at Cardington an airship of the capacity of about 5,000,000 cubic ft., an increase of 2,250,000 cubic ft. on the size of the largest airship hitherto constructed in this country. In designing this vessel regard will be had to service requirements, including naval reconnaissance. The Air Ministry will also undertake the provision of the necessary ground facilities in England and in India, and in some intermediate stages, for the accommodation of ships of these dimensions. I cannot say precisely at the moment where these intermediate stations will be fixed. Simultaneously we propose—provided satisfactory arrangements can be concluded —that the Air Ministry shall place a contract with the interest represented by Commander Burney for the construction of an airship, also of the size of 5,000,000 cubic ft., this ship being designed for commercial purposes. What data may become available as the result of the programme of research and experiment to be carried out by the Ministry will be placed freely at Commander Burney's disposal, and at the same time the Air Ministry hopes to get useful data from Commander Burney's part of the experiment. In fact, we hope to pick each other's brains. Commander Burney has done a great deal of useful work—a great deal of experiment. We hope, as a Department, to get some benefit from it.

We are already in negotiation with Commander Burney, and I am not at all unhopeful that we may be able to conclude a satisfactory agreement. Failing agreement with his group, the same offer will be extended to other airship constructors. I think your lordships will agree that Commander Burney's past services in regard to airship development deserved some recognition. The form that recognition has taken is to make him the first offer of the construction of a commercial airship. At the same time this offer in no way gives him a monopoly; on the other hand, airship constructors in the later stages of development will be invited to make their tenders, and will equally have the benefit of the research and experimental work carried out by the Air Ministry. Lastly, we propose to provide for the Burney interest to take over this ship from the Air Ministry at a reduced price in the event of their requiring it for the operation of an improved commercial airship service.

In regard to design, to ensure proper co-ordination two Advisory Boards are to be set up. The first of these boards is to deal with the proper aspects of airship development and will comprise representatives of the Treasury, Admiralty, War Office, Air Ministry, Colonial Office, and Post Office. The second board will be purely technical in character, and will include representatives of the Air Ministry, Admiralty, and War Office, and will have power to co-opt outside experts if thought desirable. This second board will be the consultant body for the construction of both ships. Certain questions affecting the training of personnel and the relations between the Admiralty and Air Ministry in regard to airship development are being referred to the Committee of Imperial Defence.

These proposals should enable two airships to be placed in commission in a shorter period than under the original scheme. The Government ship and the commercial ship will be laid down simultaneously. It will also result in the maintenance of two separate airship manufacturing plants and other ground facilities on a scale which will admit of rapid expansion. Moreover, the existing airship stations will remain State property instead of passing into private hands. As regards the financial aspect of the scheme under these proposals, it will not be necessary to incur from the outset very heavy commitments. A three years' programme only will be authorised in the first instance, and no decision will be necessary as to further developments until this programme is nearing completion. The estimated net expenditure involved during the three years will not exceed £1,200,000.

Proceeding, the noble lord dealt with some criticisms which might be made against the Government's scheme. Dealing with that of value for money, he said that for the money to be expended the Government would provide in less than three years' time extended experiment and research which should be of the greatest value and which would clear up many points of airship construction which at present were obscure. In addition, an air highway to the East would be provided suitable for airships of the largest size, with harbour accommodation and repair facilities, which would be open to all. These facilities of the air highway were absent from the first stage of the original Burney scheme. All this, he contended, was real value for money, and was an indispensable preliminary to what might eventually become an Imperial, and even a world-wide, airship service. He admitted frankly that the scheme was a compromise, but with good will it should become a fruitful compromise.

If they could develop Imperial communications and foreign communications by means of airships they would be able not only to remove unemployment in this country, but they would be able to make this island a great air port, as it had been a great seaport in the past. Further, they would build up reserves of men and material whose value to the country there was no need to stress. It was largely for those reasons that commercial airship construction had been linked up with Government airship construction from the outset. In this matter both patience and imagination were necessary. His own vision was not sufficiently distant to enable him to see the time when the debentures would be paid; but he did often have visions of what aviation would be in the future. He could even foresee the time when noble lords would leave that House on gliders with light engines and wend their way westward along the Thames, northward to Scotland and southward to Hampshire and Kent. The point he wished to make was that they would need a rest, and perhaps they might call in on one of these giant airships floating serenely and safe high up and far removed from the terrestrial dirt and noise. Under a private enterprise scheme there would be no guarantee about those airships. Under the scheme which the Government put forward each airship would have a certificate of airworthiness.

In three years' time he hoped and believed that they would have accomplished much in the way of airship research, and that they would have two airships based upon that research suitable for their respective functions in the future. He trusted those ships would represent the greatest advance yet made in this form of aviation. In ten years' time he hoped to see at least half a dozen airship constructors competing for orders in this country and building up a great and growing industry, serving the purposes of Imperial communications, bringing the peoples of the Empire and of the world closer together, and carrying mails and freight. The scheme he put forward that day was far from perfect; it was tentative and experimental, but he believed that it was the shortest way to the consummation he had indicated. It might or it might not prove somewhat slower, but it ran fewer risks than any scheme yet presented, and it would, he trusted, provide a broad foundation whereon to build.

The Marquess of Salisbury said, while he did not wish to depreciate the efforts His Majesty's Government were making for the provision of an airship service, he did not think their plan was quite so good as the plan of the late Government.

The Duke of Atholl contended that the Government were most unwise to expend £1,200,000 on an experiment of their own when a private company was willing to make it for £400,000.

Lord Montagu of Beaulieu said that if the journey to India could be shortened to three or four days and the journey to Australia to seven or eight days it would be a magnificent thing for the Empire, and that object was so important that it was worth any risk to attain it.

The Earl of Balfour asked if the Government contemplated that the airships built in the future for commercial purposes should be built in this country, or if the Government intended to carry out the doctrine of Free Trade and allow all nations to supply us with them.

FLIGHT
THE AIRCRAFT ENGINEER AIRSHIPS

Viscount Chelmsford, First Lord of the Admiralty, said that the reason why his noble friend was not relying on private firms for research was that he wished to be satisfied that proper experiments and research had been carried out.

As regards the control of lighter-than-air ships, most amicable conversations were going on between the experts of the Admiralty and the experts of the Air Ministry, and he hoped that conclusions would be arrived at which would be regarded as satisfactory to both parties.

The Duke of Sutherland was glad the Government were building two airships, although he did not agree in any way with the manner in which they were building them. From the point of view of air development within the Empire, his opinion was that the new scheme would not come up in any way to the Burney scheme.

Lord Thomson, replying to the debate, announced that a White Paper would be laid on the table of the House of Commons within the next few days, giving a synopsis of the contract proposed with the Burney interest, as well as a great many detailed explanations.

Lord Gorrell's motion was agreed to.

AUXILIARY AIR FORCE AND AIR FORCE RESERVE BILL

ON May 21 Mr. Leach, Under-Secretary for Air, in the House of Commons, moved the second reading of the Auxiliary Air Force and Air Force Reserve Bill, which has passed through the House of Lords. He said the Bill did not enlarge the air preparations already sanctioned and did not involve any expenditure other than had already been agreed to by the House. It placed no obstacles in the way of coming to an agreement with other nations for the reduction of armaments, if ever that were found possible. The Air Force Constitution Act, 1917, enabled the Government to raise and maintain an Auxiliary Air Force and Air Force Reserve, but the Government did not regard the powers given under that Act as adequate. Two new powers were sought in the present Bill. It was sought to establish county joint associations under the Territorial and Reserve Forces Act, 1907, which might be administered by Territorial Army and Auxiliary Air Force representatives within the county, or, if necessary, there might be separate administration. The Bill also provided for immediate mobilisation in defence of the British Isles in case of actual or apprehended attack, whether or not the Army Reserve or Air Force Reserve had been called out on permanent service. The Bill added no powers to those already existing for sending a single man abroad. The power of immediate mobilisation, which referred both to the new Auxiliary Air Force and also to the Reserve, would be conferred by Order in Council in case of emergency. Without this Bill such power would not exist, and it was therefore imperative to possess it. The Government had to face the facts as they were today, and he would be guilty of a gross dereliction of duty if he failed to seek efficiency. He could not neglect the equipment of the Air Force, nor seek to deprive it of adequate powers to act.

Subject to certain exceptions, the new Auxiliary Air Force would be administered by the county associations, reinforced by air representatives acting jointly. The county territorial areas might not always meet the Air Force requirements, and there was authority in such cases to set up special machinery. The County Joint Associations would have the duty of raising and administering their own air squadrons, and the training would be supervised by Royal Air Force Home Defence Headquarters. Every recruit, officer or man, agreed on enlistment to be called up and to serve in the British Isles against actual or apprehended attack. There was also power to form a new kind of Reserve for home defence service only. It was, in fact, a citizen air force. It might be asked why they needed to form an Auxiliary Air Force and a Reserve force as well. The reason was that both were experimental, and they wished to explore them and to gain experience as to the best shape that our earth defence would take. The last word in the shape of that home defence had not yet been said. The Bill would help to develop our defence plans more scientifically and economically. The Bill forged no new weapon, but merely sharpened an existing one. Above all, it provided no new facilities for offence. It was purely and solely defensive in its character, and was therefore a menace to nobody.

Until the nations agreed otherwise, he saw no escape from the duty of asking Parliament to provide for defence. Hon. members opposite had shown him once or twice that they had discovered his dislike for such a task. Because he had been somewhat frank about it, they had also shown that they feared that he might be seeking secretly to undermine the efficiency of the air defence weapon. Those fears were groundless.

Sir S. Hoare said Unionists were anxious to see the Bill, which was the same as that drafted under the late Government, become law at the earliest possible moment. If we were to build up an air defence force it was our duty to do so on a home defence basis, and not to be drawn into equipping it with such services as transport that would only be required if the units were to serve overseas. If the scheme succeeded a great advantage would be gained, not only by air defence in this country, but by civil aviation in general. The great problem in the field of British aviation was to ensure that all over the country, and particularly in our great industrial centres, a knowledge of flying and of all parts of the aeroplane should be more widely diffused. The formation of non-regular squadrons would tend to achieve that end in a very remarkable manner. Particularly would that be the case if it were supplemented by such things as aeroplane flying trials and the giving of prizes.

The 13 non-regular squadrons would, he thought, be the basis of a great citizen national air force. He believed they would succeed, and that their success would mean a great widening of the whole basis of national defence, and a great expansion generally of air knowledge and experience. The Bill was a very important measure from the general point of view of British aviation.

Capt. W. Benn said the best feature of the scheme was the effect it would have in popularising flying. While he would not be thought to be criticising the Territorial Associations, who had done their work very well, he did not think it was good to put an auxiliary air force into the hands of people who were solely concerned with military things, because an air force was very different from an army.

Major Burnie said he rather disliked the clause which provided that the men were to be enrolled entirely for service in this country. His view was that the men who were ready to defend the country must be prepared to leave the country. Before the War the practice was prevalent in this country of supplying the auxiliary forces with the cast-off arms and equipment of the Regular forces. If we were going to enlist citizens in a citizen air force, he hoped they would be provided with the most modern instruments of war.

Sir G. Butler said they also wanted propagandist centres, and he put in a plea for the universities as places where they might be able to plant the beginnings of an air spirit and inaugurate work which would spread throughout the country.

Lieut.-Colonel Moore-Brabazon emphasised the importance of getting the youth of the country interested in flying generally. We had in this country plenty of men of the right type for flying. They were to be seen riding motor-bicycles at a hideous speed every Saturday and Sunday, and usually with a girl sitting behind. That, of course, was a much more dangerous pastime than any flying. But what the Under-Secretary had to do was to get that type of man off his motor-bicycle, put him in an aeroplane, and let him have the same super-cargo tucked in behind. The way to do it was by encouraging the sporting side of flying. He had been on deputations to the Air Ministry to get some sort of help of the kind in getting the youth of the country into the air, and had found the Ministry very "sticky." He hoped that side of the subject would receive a little more consideration. The youth of this country made the finest flyers in the world. But he did not think that it really appealed to those youths to take up a thing like flying by trying to make him become a soldier. To give them the necessary taste for flying that would induce them to become soldiers they must be made interested in the sporting side of it, and the way to do that was to encourage competitions with small-power machines and gliders under the auspices of the Royal Aero Club.

Mr. Leach, replying upon the debate, said the Bill was in the nature of an experiment, confined to quite limited dimensions. The Auxiliary Air Force it was proposed should consist of six squadrons, and the Government hoped to raise them this year. The total number of officers who would be enlisted for the six squadrons would be about 160, with possibly 1,000 men. Seven squadrons were suggested for the Special Reserve Force, requiring 104 officers and 780 men for home defence purposes solely. No officer would be given a commission in the Auxiliary Air Force unless he had learned to fly. In order to enlist an extra number of men who would go into training to learn to fly the Government would be favourably inclined to consider the question of making them grants towards the cost. They were not proposing to raise squadrons in country districts, and they would not employ amateur mechanics. The aerodrome question had not been overlooked. They were investigating in connection with the Territorial Associations which were the most suitable sites at which to begin operations. All their airmen would be trained mechanics. He felt pretty confident that the joint associations would work well; if they did not the Bill would enable them to be dissolved. He thought the Bill made it clear what was meant by liability to be called up for service in the British Isles. Such service included any flight of which the points of departure and intended return were within the British Isles or their territorial waters. The airman could therefore be sent to any foreign country which was within the capacity of an aeroplane under those conditions.

The Bill was then read a second time.

THE ROYAL AIR FORCE

London Gazette, May 20, 1924

General Duties Branch

The following are granted permanent commns. in the ranks stated (May 21):—Squadron Leader J. C. M. Lowe. Flight Lieut. P. R. T. J. M. I. C. Chamberlayne, A.F.C. Flying Officer S. N. Webster, A.F.C.

Lieut. T. Fetherstonhaugh, K.R.R.C., is granted a temp. commn. as Flying Officer on seconding for four years' duty with R.A.F.; May 15. Pilot Officer E. Reid is promoted to rank of Flying Officer; May 19. Flying Officer F. C. Baker is transferred to Reserve, Class C; May 21. The short-service commns. of following Pilot Officers are terminated on cessation of duty (May 21):—A. G. Everett, H. A. Le Feuvre.

Medical Branch

Flight Lieut. T. J. D. Atteridge is granted a permanent commn. in rank stated; May 21.

Reserve of Air Force Officers

S. B. Atkinson is granted commn. in Class A, General Duties Branch, as Pilot Officer on probation; May 20. Flying Officer E. A. J. Brown is transferred from Class A to Class C; May 20. Flying Officer A. T. Maxwell resigns his commn.; Mar. 11.

The following officers are confirmed in rank, with effect from the dates indicated:—*Flying Officers.*—C. H. R. Johnston; Nov. 8, 1923. W. R. G. Atkins, O.B.E., C. B. Collins, J. V. Hay, H. G. Herbert, C. W. Halfhide, C. Hole, E. C. Hubbard, W. T. Kanaar, W. J. Metcalf, H. W. Roberts, W. A. Syme, L. P. Timmins, C. R. H. Trevor, N. W. Wale, C. E. Welsh, W. Woodman; Mar. 18. G. G. Green, F. Tymms, M.C.; April 1. R. C. Crawley, G. L. Hunting; April 16. *Pilot Officers.*—F. Allen, H. V. Bullock, C. T. S. Capel, H. G. Eggar, R. J. Hibberd, C. A. Jamblin, D. A. Watson; Mar. 18. G. Fitz-G. Atkinson; April 1. A. Higham; April 9. J. C. Montgomery; April 13. E. P. Smith; April 30.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

General Duties Branch

Air Commodore B. C. H. Drew, C.M.G., C.B.E., to R.A.F. Depot on transfer to Home Estab.; 12.5.24.

Group Captain A. L. Godman, C.M.G., D.S.O., to R.A.F. Depot on transfer to Home Estab.; 24.4.24.

Flight Lieutenants: E. H. Richardson to R.A.F. Depot on transfer to Home Estab.; 24.4.24. C. K. Chandler, M.B.E. to H.Q., India; 9.4.24.

Flying Officers: D. S. Allan to No. 5 Squadron, India; 21.4.24. (Hon. Flight-Lieut.) P. N. Melitus to Aircraft Depot, India; 17.4.24. R. F. Browne, D.F.C., to R.A.F. Depot (Non-effective pool) on transfer to Home Estab.; 8.5.24. A. B. Cree and S. R. Boldero, to R.A.F. Depot (Non-effective Pool) on transfer to Home Estab.; 24.4.24. L. E. Cutforth to No. 5 Flying Training Sch., Shotwick; 20.5.24. T. Featherstonhaugh to No. 24 Sqdn., Kenley; 15.5.24. C. V. Lacey, A.F.C., to Aeroplane and Armament Experimental Estab., Martlesham Heath; 3.6.24. P. W. Adams to Sch. of Balloon Training, Larkhill; 22.5.24.

Pilot Officers: B. C. Mason to No. 3 Sqdn., Upavon; 26.5.24. C. H. Ratcliffe to No. 60 Sqdn., India; 9.4.24. A. E. Stewart to No. 31 Sqdn., India; 21.4.24.

Stores Branch

Flight Lieutenant W. J. King, D.C.M., to Station Commandant, Iraq; 11.4.24.

Pilot Officer (Accountant) C. W. Cackett to Record Office, Ruislip; 3.6.24.

NOTICE TO AIRMEN

Rules for Flight over Air Routes.

IT is notified :

1. In order to give general application to the rules designed to minimise the risk of collision, which have hitherto only applied to aircraft flying over an officially recognised air route, the following rules have been agreed on by the British, Belgian and Dutch Governments :—

"(*a*) The normal procedure in order to reduce the risk of collision to the minimum consists in flying in a straight line, steering by the compass and carefully watching the air space in the region ahead of the aircraft. Every pilot, when flying on a compass course, shall, whenever it is safe and practicable, fly on the right of the straight line joining the point of departure to the point of arrival.

"(*b*) When an aircraft is flying beneath cloud, it must keep at a fair distance below the cloud base in order to see and be seen.

"(*c*) When a pilot decides to follow a route which is officially recognised or consists of a line of ground marks such as a road, railway, canal, river, etc., he should bear in mind that the risk of collision with another aircraft following the same route is considerable. Every pilot following such a route, therefore, shall endeavour to keep it at least 300 metres on his left.

"(*d*) Every pilot who decides to cross any route he is following shall cross it at right angles and as high as circumstances permit. Should he desire, after crossing it, to resume flight in a direction parallel to the route, but keeping it on his right, he must keep sufficiently far from it to avoid aircraft following it in the normal way.

"N.B.—These regulations shall in no way relieve pilots from the necessity of conforming to the regulations set forth in Annex D of the International Air Convention of October 13, 1919."

2. Pilots are not obliged by the above rules to follow an officially recognised air route, where such exists. "Point of arrival" and "point of departure" in rule (*a*) include all turning points on routes which are normally not flown on one straight course. The straight line referred to is that joining the extremities of each section of the route which is flown on one course.

3. Certain portions of the following routes have been officially recognised by the authorities concerned :—

London—Paris, *vide* Notice to Airmen No. 64 of 1922.	
London—Brussels ,, ,,	5 of 1923.
Paris—Brussels ,, ,,	23 of 1923.
London—Rotterdam—Amsterdam Amsterdam—Berlin . . . . . . Rotterdam—Berlin . . . . . . Rotterdam—Brussels—Paris . .	*Vide* Notice to Airmen No. 8 of 1924.

4. Instances have recently occurred in which pilots have been careless in the observance of the rules which have been expressly designed for the general safety of all aircraft.

5. The importance of rigidly adhering to these regulations cannot be too strongly accentuated, and all pilots are invited to report at once to the Secretary, Air Ministry (D.C.A.), any infringements which may come to their notice.

6. Previous Notices.—The following Notices to Airmen are hereby cancelled :—Notice to Airmen No. 64 of 1922, paragraph 2 ; No. 22 of 1924 ; No. 5 of 1923, paragraph 3 ; No. 23 of 1923, paragraph 2.

(No. 42 of 1924.)

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Government's Airship Scheme

A SUPPLEMENTARY Estimate for £350,000 in connection with the Government's airship scheme was issued on May 23. Of this sum, £150,000 is for airships and £200,000 for airship developemnt.

The details of the scheme as recently given in Parliament appear in FLIGHT.

"Bristols" at Wembley.

AMONGST the aeronautical exhibits at the British Empire Exhibition at Wembley, the Bristol Aeroplane Co., Ltd., have quite an interesting and very representative display. In addition to the famous 400 h.p. "Jupiter" radial air-cooled engine, they are showing the 100-h.p. "Lucifer"—a 3-cylinder air-cooled radial—and one of the "Cherub" light 'plane engines. One of the "Bristol" gas starters and a number of models and photographs of "Bristol" machines are also shown.

Foreign Decorations.

THE KING has given authority for the wearing of the following decorations, conferred in recognition of the valuable services of the recipients :—

Order of the Rising Sun (Japan) (Fifth Class).—Capt. W. F. Jones (late R.A.F.). Sixth Class.—Mr. R. M. Brutnell, Sergeant Mechanic (late R.A.F.).

Gordon Shephard Memorial Prize Essay Awards.

THE Air Ministry announces that the Gordon Shephard Memorial Prizes, which are given annually for the best essays submitted by members of the Royal Air Force on subjects selected by the Air Council, have been awarded as follows in the 1923 competition :—

1st Essay.—1st prize : Flight Lieutenant J. C. Slessor, M.C. ; 2nd prize : Flight Lieutenant J. L. Vachell, M.C.

2nd Essay.—1st prize : Squadron Leader W. S. Douglas, M.C., D.F.C.

The competition was established as a memorial to the late Brigadier-General G. S. Shephard, D.S.O., M.C., Royal Air Force.

Alan Butler Flies to Prague.

DURING the last few weeks Mr. Alan Butler, Chairman of the De Havilland Aircraft Co., has been making an extensive aerial tour of Europe in his D.H. 37, and on May 20 arrived at Prague. He left London on April 16, and visited the following towns:—Lyons, Nice, Milan, Venice, Zagreb, Belgrade, Sofia, Bukarest, Budapest and Vienna.

Independent Force (R.A.F.)

THE sixth annual re-union dinner of the Independent Force, including all officers of army troops and other attached units, will be held at the Royal Air Force Club, on Tuesday, June 24, 1924, at 7.45 p.m. for 8.0 p.m. Orchestra from the R.A.F. Central Band will be in attendance. Air Chief Marshal Sir H. M. Trenchard, Bart., G.C.B., D.S.O., A.D.C., will be in the chair, and Group Capt. H.R.H. the Duke of York, K.G., K.T., G.C.V.O., has graciously signified his intention of being present. The committee of the R.A.F. Club have kindly consented to making honorary members for the occasion of those members who do not belong to the R.A.F. Club. Tickets, price 8*s.* 6*d.* (excluding wines), may be obtained from the Hon. Secretary, I.F. (R.A.F.) Dinner Club, Room 546, Adastral House, Kingsway, W.C. 2 (to whom any alteration in address should be sent).

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; I.C. = internal combustion ; m. = motor
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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Published May 29, 1924

363. G. and U. ANTONI. Aircraft planes. (215,048.)
4,583. H. LEITNER. Screw propellers. (215,130.)
7,731. H. LEITNER. Screw propellers. (215,156.)
12,322. J. A. ALDWINCKLE. Screw propellers. (215,192.)
13,555. NAAMLOOZE VENOOTSCHAP MACHINERIEËNEN APPARATEN FABRIEKEN. Installations for illuminating and indicating the landing-places in aerodromes. (210,386.)
14,521. G. H. THOMPSON. Screw propellers. (215,211.)
21,098. E. PISTOLESI. Air-propellers. (215,243.)

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